

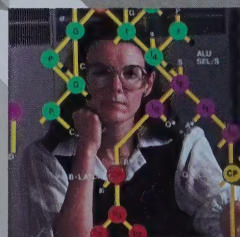
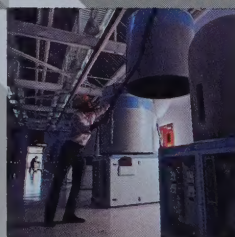
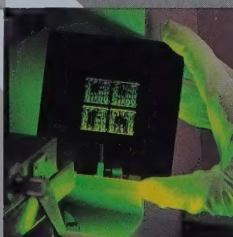
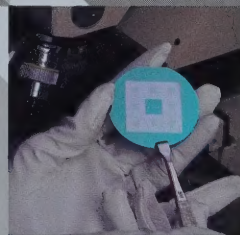
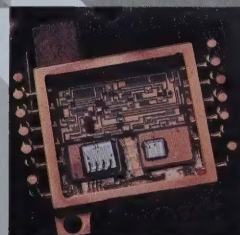
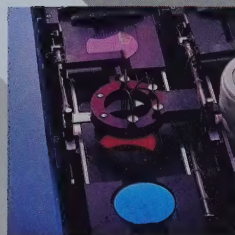
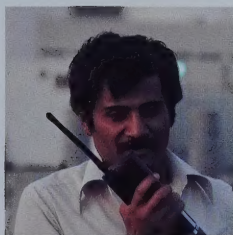
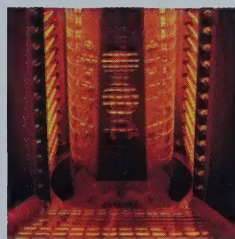
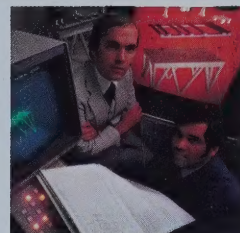
I N V E S T O R

GENERAL  ELECTRIC

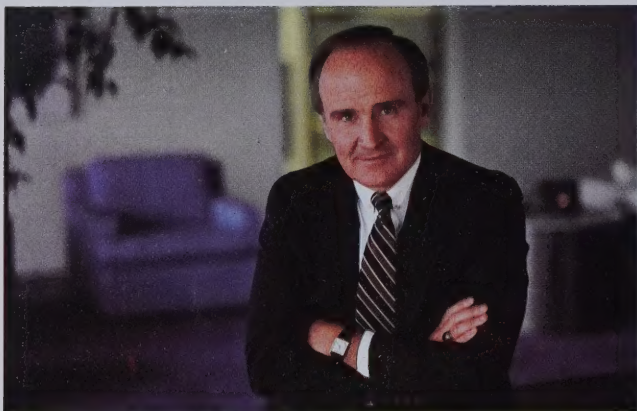
Fall 1981

AR26

**People-relevant innovation —
GE puts the people and
businesses in place for
growth in the '80s**



Positioning GE for growth in the '80s



“We’re putting people and an organization in place to meet GE strategic goals. We’ve made a commitment to our customers on quality and to our share owners on innovative, profitable growth.”

— John F. Welch

A realignment of the Company's Sector organization – the first major change in the Sector structure since it was created in 1977 – aims at speeding business growth.

Accelerating the development of growth businesses is a key to General Electric progress in the 1980s. Innovation linked to markets will be a wellspring for a new surge of growth. Recent changes in the Company's Sector organization provide the mechanism by which GE will take full advantage of its growth opportunities.

Those were the messages that GE Chairman John F. Welch recently communicated to Company leadership upon announcing a number of organization and staffing changes in General Electric management.

Among other things, the changes signal the Company's increased focus on the rapid expansion of its microelectronics capabilities and its pursuit of growth opportunities in the services businesses – information, credit, construction and engineering. Additional opportunities abound in engineered materials, industrial products, energy, transportation and natural resources.

“We’ve made a commitment to our customers on quality and to our share owners on innovative, profitable growth through technological leadership and improved productivity,” the Chairman observed. “We’re putting the people and the organization in place to meet these strategic goals.”

In a major consolidation of its electronics operations – concurrent with the acquisition of Intersil, Inc., and Calma Company earlier this year as well as with recent large investments in new microelectronics facilities (see story, pages 6-10) – General Electric on September 1 melded its electronics-based businesses into a new Technical Systems Sector. Named to head it was James A. Baker, an Executive Vice President with an outstanding reputation for leading and managing change at General Electric. His new Sector will ration-

I N V E S T O R

GENERAL  ELECTRIC

Summer 1981

AR26



At the center of GE strategy —
technological excellence



Phoenix



New GE Chairman discusses the hallmarks of his administration

OCT 8 1981

Presiding at the 1981 Statutory Meeting April 22 in Phoenix, three weeks after assuming his duties as GE's new Chairman of the Board and Chief Executive Officer, John F. Welch delineated the kind of company that he and his new management team want General Electric to be a decade from now:

"We would like GE to be perceived as a unique, high-spirited, entrepreneurial enterprise — a company known around the world for its unmatched level of excellence. We want GE to be the most profitable highly diversified company on earth, with world-quality leadership in every one of its product lines."

Achieving this goal, he said, will require everyone associated with General Electric to make a personal commitment to the utmost in quality and individual excellence. In his view, this commitment is "our surest path to continued business success. Quality is our best assurance of customer allegiance. It is our strongest defense against foreign competition, and the only path to sustained growth in earnings."

The new GE Chairman offered this vision as the way in which General Electric people can continue to build on the significant achievements of his predecessor, Reginald H. Jones. "Under Reg Jones' leadership," Welch said, "the Company was not only diversified and internationalized, but also strengthened — technologically and financially."

GE — a diversified, 'high-tech' company

Chairman Welch characterized General Electric as "one of the most widely diversified, high-technology companies in the world." Sales in 1980 totaled \$25

billion, with earnings of \$1.5 billion.

He noted that while GE's traditional businesses involved with supplying electrical products for U.S. power stations, factories and homes are still healthy and expanding, today they provide only 44% of GE earnings — down from 80% a little over a decade ago. The other 56% comes from fast-growing businesses in man-made materials, natural resources, aerospace, land transportation equipment, medical systems, and major new lines of opportunity such as credit services. Within this total Company product mix, he said, 16% of the earnings about a decade ago came from international activities. Counting exports, this has grown to 42% today.

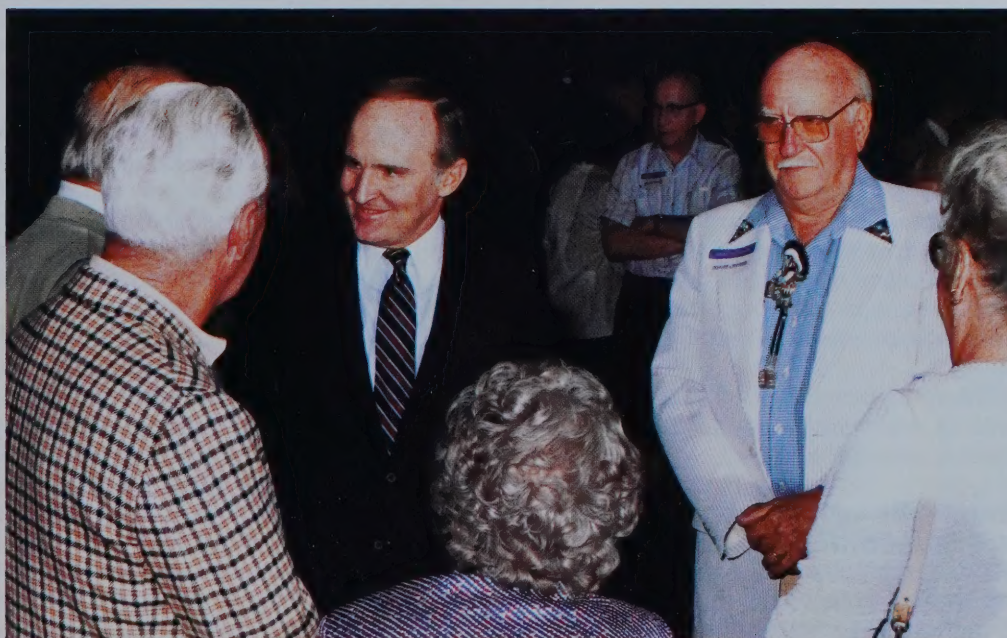
GE financial strengths, Chairman Welch noted, are shown by the fact that even with research and development expenditures that amounted to \$1.6 billion in 1980 and investments in plants and equipment that came to nearly \$2 billion, "the Company's financial position remains strong, with almost \$2 billion in cash and marketable securities and a low debt-to-equity ratio."

He sees today's management team inheriting "a strong, healthy company, well positioned strategically and financially for vigorous future growth."

Recent major moves in electronics

An important technological initiative cited by Chairman Welch is GE's current thrust in using as well as supplying factory automation systems. Discussing the rationale behind the Company's recent major steps in the electronics field, he observed that "the U.S. is poised for a dramatic surge of investment in

Before calling 1981 GE Statutory Meeting to order on April 22 in Phoenix, new GE Chairman and Chief Executive Officer John F. Welch (center) met informally with share owners during a morning kaffeeklatsch.



Front Cover: the symmetrical mosaic world of today's microelectronics unfolds in the test area of Intersil, Inc., GE's new semiconductor subsidiary in Cupertino, Calif. A tiny silicon chip (center) is checked by a computerized tester prior to being placed inside one of Intersil's microcircuit products.

new plants and equipment — what has been called the 'reindustrialization of America'. We believe a large, profitable market is emerging for equipment that addresses these productivity and modernization issues. General Electric is preparing itself to serve these new markets." Recent acquisitions of the two California-based electronics companies, Intersil, Inc., and Calma Company, profiled on pages 8-13 of this *Investor*, are expected to further GE progress toward this objective.

Prior to purchasing Intersil and Calma, he said, GE already had important capabilities for serving industrial markets. The Company has led in automating major industries such as steel and paper. GE innovations in numerical controls have helped to automate job-shop operations, while GE programmable controls are automating assembly operations. Also, the General Electric Information Services Company offers software and consulting services that can coordinate the whole flow of steps in running a business — from order entry to factory scheduling to customer billing.

The Intersil and Calma acquisitions, he reported, fill gaps in the Company's ability to supply advanced production systems. Intersil assures General Electric of a supply of integrated circuits, or chips, essential "to keep advanced electronic technology running in this Company's bloodstream." One GE use of Intersil chips, the Chairman explained, will be in developing industrial robots. Calma, on the other hand, is a leading manufacturer of the interactive graphics which are basic to design technologies.

General Electric's objective in the 1980s, he said, is to be a major worldwide producer of automation systems. Intersil and Calma, coupled with the Company's own internal development, "will enable GE to become what one newspaper called us — 'a world supermarket of automation for the reindustrialization of America'."

The quest for excellence

Chairman Welch summed up his report by defining General Electric's quest for excellence as "a faithfully held commitment of everyone associated with the Company — personal excellence — as a dominant aspect of GE's culture. To me, excellence means being 'better than the best'."

"General Electric already is a world-class company, with one of the greatest reputations in world business. I am asking all of my associates, in GE offices and laboratories and factories, to take that reputation up several notches, to a point where, in the world's assessment, our quality — our excellence — are not issues for conjecture, but indisputable facts.

"We intend to make our share owners, our employees, ourselves prouder than ever to be associated with General Electric."

Matters to be voted upon at the meeting were the next items on the agenda. The Chairman reported that approximately 83% of the outstanding shares entitled to be voted were represented at the meeting through proxies returned to the Company.

The 17 nominees for Director listed in the Proxy Statement were placed in nomination to serve for the ensuing year. All the nominees already were serving on the Board, except Dr. Lawrence E. Fouraker of Harvard Business School. No other nominations were made.

During the discussion of Directors, the Chairman announced that at its March meeting the Board had decided to revert to the practice of having one share owner meeting a year — the Annual Meeting held in April.

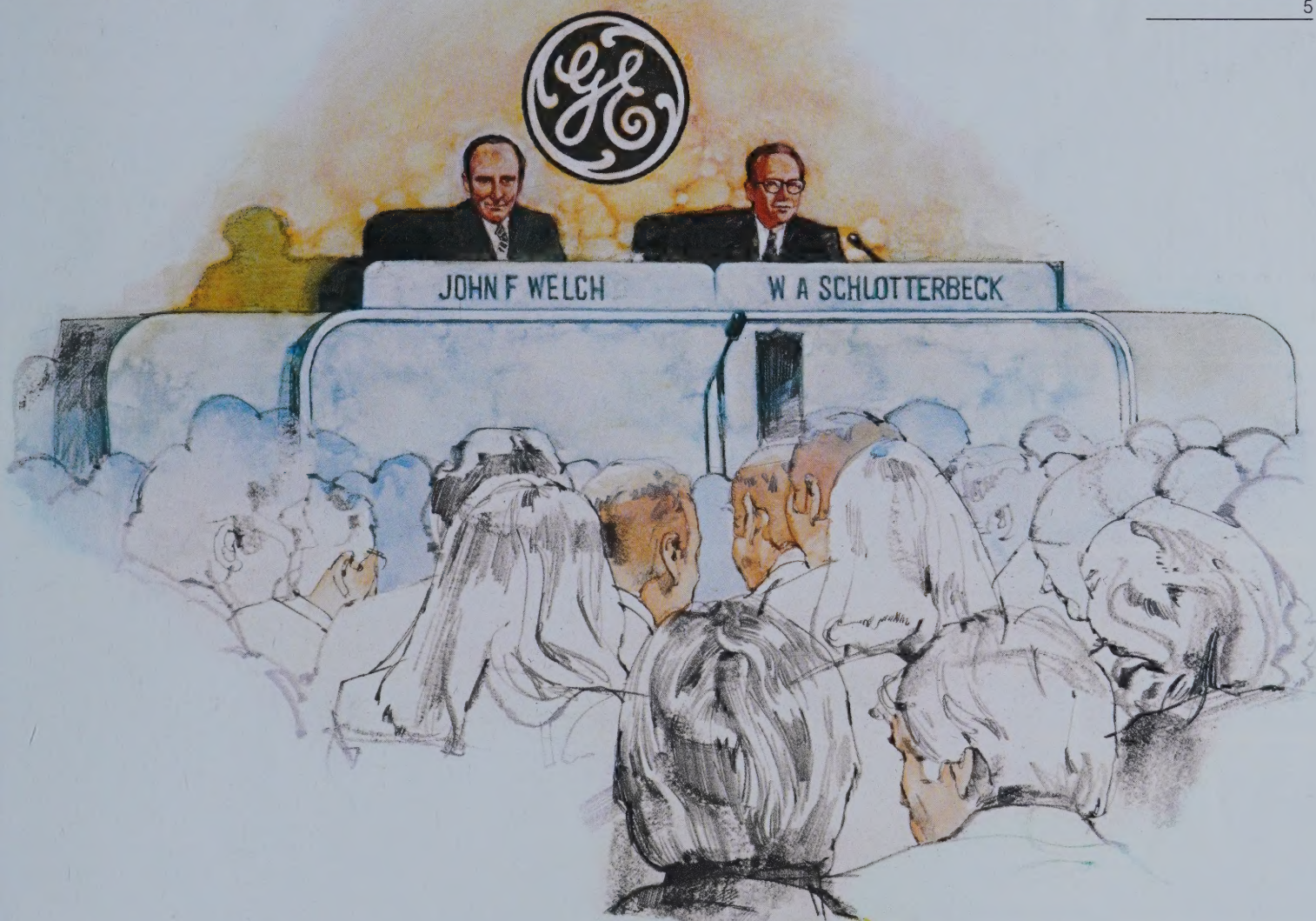
The appointment of Peat, Marwick, Mitchell & Co. as Independent Certified Public Accountants for 1981 was proposed. Several questions were asked by share owner John Gilbert concerning GE's internal auditing staff and audit procedures for the GE pension trust. Chairman Welch discussed the comprehensive nature of the Company's internal auditing effort, responding that GE "has 150 internal auditors, based in Schenectady, N.Y., and another 200 in the field."

As for auditing of the pension trust, Thomas O. Thorsen, Senior Vice President—Finance, commented that GE's trust investments operation manages the pension trust: "The Public Accountants, as well as our own auditors, check extensively on the operation of our pension trust and the pension securities." Thomas L. Holton, of Peat, Marwick, Mitchell & Co., expressed satisfaction with how General Electric's internal audit staff cooperates with the accounting firm.

The first share owner proposal, submitted by Lewis and John Gilbert and Wilma Soss, all of New York City, and presented by John Gilbert, requested the Board of Directors to take the steps necessary to adopt cumulative voting in the election of Directors — as a means of permitting holders of less than a majority of shares to elect Directors. Chairman Welch expressed a different point of view, saying that "cumulative voting could permit the election of Directors who might represent special interests and objectives." He noted that under the present method of electing Directors, which has been in place since GE was founded, "each Director must receive a plurality of all the votes. Therefore, each Director regards all the share owners as constituents."

The second share owner proposal, submitted by Louis Brusati of Chicago, asked the Board of Directors to compile and include in each Proxy Statement data related to all stock options granted since 1953 — to enable share owners to meaningfully review stock-option operations. As noted in the 1981 Proxy Statement, through the years a great deal of this information already has been reported. At the meeting, the Chairman pointed out the substantial time, effort and expense required to comply with this proposal and said that "in our judgment, the data would be of little interest to the great majority of share owners." He added: "The Stock Option Plan gives us a highly competitive, attractive compensation plan which, in turn, gives share owners the best chance of getting the best value for GE stock."

Share owner proposal number three, submitted by the Young Americans for Freedom of Sterling, Va., requested a yearly report detailing all business



dealings with communist countries. No spokesperson was present to speak for the proposal. Information on this subject, developed in response to another proposal on this subject which was withdrawn, is presented on page 6.

Share owner proposal number four, co-sponsored by a number of religious organizations, requested the Board to undertake a human and environmental study of the U.S. Department of Energy's plant at Pinellas, Fla., which GE manages — as a means of developing information on any possible hazards at this plant. Speakers for the church groups were Sister Marita Beumer, Somerton, Ariz.; Enid Jones, Phoenix; and William Whistler, Bridgeport, Pa. Explaining the Board's position, the Chairman noted that, in June 1979, GE prepared a detailed report informing interested share owners about GE's role in operating this plant. Copies remain available. Welch continued: "Over the years, the U.S. government has relied on the technological and manufacturing capability of the private sector to produce the equipment needed for national defense." In helping meet U.S. defense needs, "GE for 24 years has safely operated the Pinellas plant, which produces electronic components for use in the U.S. nuclear weapons program."

The fifth share owner proposal, submitted by Patricia Birnie of Columbia, Md., and seven other share owners, requested the Board of Directors to

furnish a share owner report stating the Company's financial rationale for remaining in the nuclear business and the environmental, ethical and public-health factors seriously considered in Company evaluations. Chairman Welch replied that GE has reported to its share owners regularly on many aspects of its nuclear business and on U.S. energy needs, and therefore a special report at this time doesn't seem necessary. He emphasized that the Company offers power generation equipment that operates on various fuels — coal, gas, oil and nuclear. "Through Utah International, we supply coal, uranium, petroleum and natural gas. And we are active in research on coal gasification" and other future forms of energy. "But right now, the U.S. cannot afford to close out any energy option, including the nuclear option."

During the general question period, share owner William Heyn, Lancaster, Pa., asked how GE's inflation-adjusted accounting system will affect the Company's future. The Chairman responded that "my predecessor, Reg Jones, left me a keen awareness of inflation accounting. So we now look at our inflation-adjusted profits as the *real* profits." He observed that inflation accounting helps managers become more realistic about their pricing: "It drives the whole organization to look at replacement values for existing equipment. I would say that your Company

**Quality and excellence—
'our surest path to success'**



has as good an understanding of inflation accounting as anyone in American industry."

Share owner Ludwig van Ludvig of Moab, Utah, asked about present GE efforts in fusion energy research and, more generally, about GE quality-related efforts to become the world's top energy company. Replying, Welch said he foresaw the fusion energy era as "still a long way off," but noted that GE continues to research fusion energy at the University of Rochester. On the subject of quality, Welch repeated a comment from his talk — "if we in General Electric do the right things over the next decade, quality will be an indisputable fact."

Several share owner proposals did not appear in the 1981 Proxy Statement or come to a vote at the meeting because they were resolved in advance. Among them:

- > a proposal submitted by John and Lewis Gilbert and Wilma Soss asking that information on fees paid to auditors be included in the Proxy Statement. The 1981 Proxy Statement included this information and the proposal was withdrawn.
- > a proposal asking for a report on Company activities in genetic engineering. It was withdrawn by the United Church Board for World Ministries and 11 other church groups when the Company agreed to meet with them. Dr. Roland W. Schmitt, Vice President — Corporate Research and Development, made

a presentation to a group of 15 church representatives covering areas of concern they had identified. He and four associates then responded to questions. A written summary of this presentation and discussion is available to interested share owners.

> a proposal requesting detailed information on Company trade with communist nations. The United Church Board for World Ministries withdrew the proposal when GE agreed to provide certain information about such transactions. The proponent was interested in sales to Warsaw Pact bloc countries (Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, Romania and the Soviet Union) and to non-Pact-member Eastern European communist nations (Albania, Yugoslavia).

Sales by GE and consolidated affiliates to Warsaw Pact and other Eastern European nations

(\$ Millions)	1980	1979	1978	1977	1976
Warsaw Pact Bloc	\$46.5	\$32.9	\$44.3	\$36.4	\$35.7
Other Eastern European Nations	9.8	13.6	23.1	8.6	6.4
Total	\$56.3	\$46.5	\$67.4	\$45.0	\$42.1

Using 1980 as the example, the principal products involved have been industrial drive systems, plastics, coking coal, gas turbine parts and a CT scanner. The bulk of sales in recent years has been to Poland, Romania and Yugoslavia. In 1979, a number of limited-range mobile radios were sold by a European affiliate to the Soviet Union for use at the Olympic Games in Moscow. These radios are low-technology units, and GE has no reason to believe that these or, by their nature, any of the other products involved are used by police or military forces for repressive purposes.

General Electric conducts business in more than 120 nations. This business is conducted in a manner consistent with the laws of the land and in accordance with applicable U.S. export regulations, including guidelines governing U.S. trade with communist nations.

Results of the balloting included the reelection of the 16 incumbent Directors and election of the new Board member, Dr. Fouraker. There was approval, by 99.8% of the shares voted, of the appointment of Peat, Marwick, Mitchell & Co. as Independent Certified Public Accountants for 1981. The five share owner proposals were defeated.

- > Proposal number one, relating to cumulative voting, received a favorable vote of 5.2% of the shares voted.
- > Proposal number two, relating to stock option data, received a favorable vote of 2.5%.
- > Proposal number three, relating to a yearly report on trade with communist countries, received a favorable vote of 1.3%.
- > Proposal number four, relating to a study of the Pinellas plant operations, received a favorable vote of 2.1%.
- > Proposal number five, relating to a report on Company involvement in the nuclear industry, received a favorable vote of 2.2%. □

At the center of GE strategy — technological excellence

7

**A portfolio of
personal reports:**

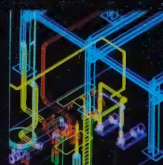
**Intersil: toward
new generations of
electronic servants**

Page 8



**Calma: a critical
link for the 'factory of
the future'**

Page 11



**Medical Systems: now,
the era of 'high-tech'
X-rays for patients**

Page 14



**Major Appliances:
factory renewal
will mean better
products for consumers**

Page 16



**Television: quality
helps GE move up in
market position**

Page 17



**Steam Turbine-
Generator: GE's 'new
electronics' watch
over station operation**

Page 18



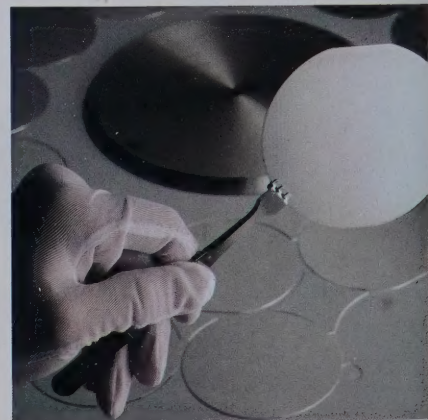
**Aircraft Engine:
computers, engineers
team up to improve
GE jet engines**

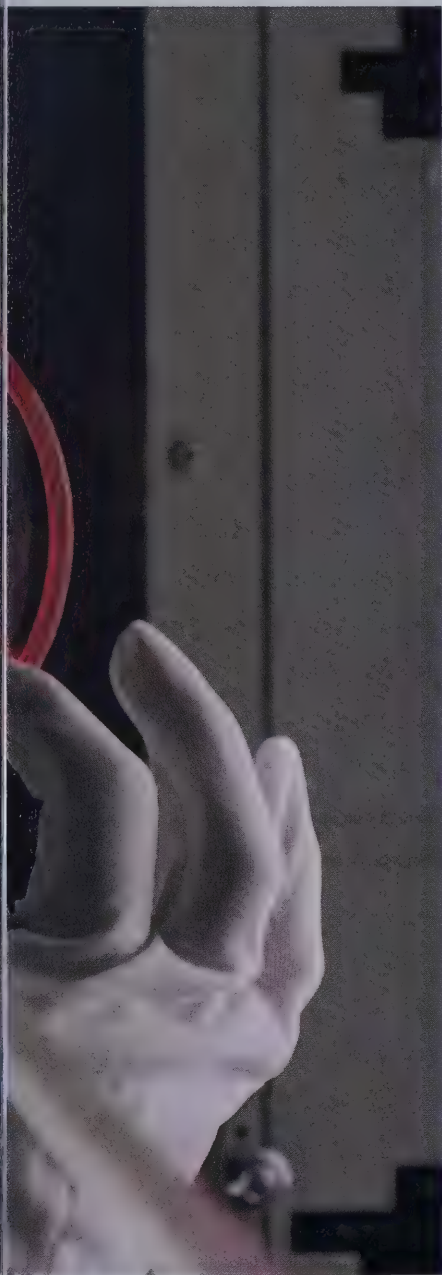
Page 19



Intersil: toward new generations of electronic servants

Silicon wafers at Intersil are pulled slowly from a hot furnace to assure uniform cooling of their surfaces. Each wafer contains hundreds of micro-electronic chips which represent partially assembled integrated circuits.





A glittering talisman of the 20th-century microelectronics revolution, this chip-laden Intersil wafer (left) packs vastly superior computing power into less space than similarly sized wafers of just a few years ago.

At right: Intersil's Richard Hood sits at computerized console where silicon wafers are cut up into chips with the help of powerful lasers.

As part of General Electric's new thrust in high technology, the Company acquired Intersil, Inc., in February 1981 for \$235 million. Intersil's microprocessors, data acquisition circuits and power MOS semiconductors are key building blocks in advanced industrial electronic systems for the "factory of the future." Richard Hood, director of product and test engineering, tells how the "marriage" of GE and Intersil can better serve Intersil's customer needs as well as GE's in-house needs for microelectronics.

You won't find Silicon Valley on any California map. It's more a state of mind than a geographic area, but Intersil is smack in the middle of the high-tech phenomenon taking place in a 20-square-mile area between San Francisco Bay and San Jose. The integrated circuit was born here. It's home for some of the world's most innovative electronics firms — and we believe our creative engineering and manufacturing know-how have made us one of the brightest spots in the Valley.

Intersil is based in Cupertino, with more than 3,000 employees, and is one of the world's major manufacturers of integrated circuits — those "gee-whiz" tiny silicon chips half the size of a fingernail and etched with circuitry far more powerful than the first computers. The company also makes memory and microprocessor systems for various computer-related applications. And our Datel-Intersil division in Mansfield, Mass., makes data acquisition products for industrial and military uses.

An enviable 25% annual sales growth record the past five years has moved us ahead among the top semiconductor firms. Competition is fierce. It's a roller-coaster kind of business, and many companies haven't stayed on the track. Nevertheless, the electronics industry is a leading growth area in an otherwise rather flaccid economy. It's Intersil's mission to help customers and Gen-

eral Electric overcome various constraints on productivity by tapping the contagious, innovative and pioneering spirit for which this industry is famous.

A key feature of Intersil is its *forward integration capability* in both digital and analog systems. We can use chip technology to build modules, subsystems and system products which give us a lot of versatility in serving all types of customer needs.

In 1980, the world market for microelectronics topped \$12 billion. In the chip race, the U.S. holds a commanding position, but Japan is mounting an all-out challenge to American supremacy. Young semiconductor firms are churning out chips like jellybeans — and Intersil is no exception.

Only a few chip companies, though, have developed Metal Oxide Semiconductor (MOS) technology into power transistors. Intersil is one. This market has enormous potential and we are at



the forefront of this technology.

Intersil also is a leading supplier of Complementary MOS technology combining high performance with very small power needs. These large-scale integrated circuits are particularly suited to hand-held, battery-

Using high-power microscopes, skilled technicians mount silicon chips in frames and seal them to provide protection.



powered equipment. They have excellent immunity to electrical distortion, or "noise," which makes them useful in factories where non-CMOS products often have a tough time performing. CMOS capability will be mandatory for anyone supplying products for the "factory of the future."

Our firm also manufactures data acquisition products typically used for monitoring and controlling industrial instruments. They link the microprocessors and computers to the "real world" of analog systems.

The 'new' Intersil that merged with GE is a combination of three venture capital operations which started ten years ago. Intersil's most recent acquisition, the 1979 merger with Datel Systems, Inc., makes Intersil the second-largest data acquisition supplier in the industry. The market for these devices is one of the fastest growing in the semiconductor field.

Improving yield is the semiconductor industry's Holy Grail. Over the next 20 years, transistors on a chip could approach a million before the limits of physics are reached. In order to build smaller, cheaper, more powerful and more energy-efficient chips, a company is committed to go on to the next "superchip" — or go out. There's no middle ground.

Intersil is well positioned to serve emerging markets as well as traditional ones. We expect that, when sales reach a half billion dollars in the next few years, at least 15-20% will be to GE divisions. We make a broad line of electronic products applicable to GE products and processes.

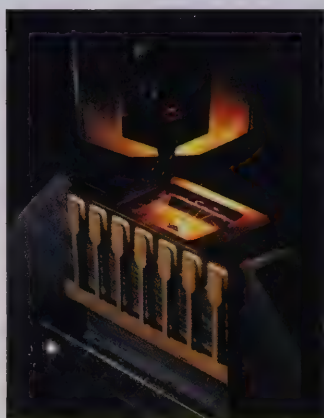
In short, this is an exciting time at Intersil. The silicon chip is becoming ubiquitous. With the advent of VLSI (very-large-scale integration), scientists are starting to apply submicron geometries. A new generation of electronic servants is being spawned, and they will enrich life more than most people realize.

— Richard Hood



In designing semiconductor circuits, Intersil uses computerized graphics terminals sold by Calma Company, another new GE subsidiary.

A marvel of miniaturization, this integrated circuit — with a chip ready to be encapsulated atop its multi-pin base — is a multifunctional analog-switching device used for advanced aerospace projects.



Calma: a critical link for the 'factory of the future'



Computerized designs such as the 16-color kaleidoscope drawing on the screen behind this engineer are now possible, using advanced graphics consoles in Calma's research lab. Just four years ago, no supplier even offered color in computer-aided design and manufacturing — an indication of how far CAD/CAM technology has come.

Probably the most essential component in supplying the advanced industrial systems for the automated "factory of the future" is CAD/CAM (computer-aided design and manufacturing). In April 1981 — as another push in high technology — GE acquired Calma Company, a subsidiary of United Telecommunications Inc., for \$100 million plus additional compensation of up to \$70 million geared to Calma sales over the next four years.

Rebecca Costa, a systems writer, discusses how the GE-Calma merger will benefit customers and help increase GE's automated systems applications.

Let's say you own a factory. What if you could clone your best design engineers? Imagine the gains your firm could achieve if you could multiply the capabilities of your top achievers.

Such a dream may not be genetically possible, but Calma's CAD/CAM systems are a step in

that direction. No longer must a draftsman — in time-consuming fashion — work on a drafting board with a compass, template, eraser, scratch pad and masking tape. Gone are countless manual "reiterations." Instead, work output can be greatly increased.

In industry today, more and more engineers and draftsmen are visualizing their thoughts electronically, using computer-aided graphics. Calma, headquartered just minutes away from Intersil in Sunnyvale, Calif., is a major supplier of these interactive graphic systems, which include technologies used for CAD/CAM applications.

We like to say we're in the productivity improvement business. Our improvements can range from 50% to 500%. As part of the



Calma's Rebecca Costa (center) chats with fellow employees outside Sunnyvale, Calif., facility. The company, in placing great emphasis on training to provide a full array of software products, encourages its people to enroll in a comprehensive educational program, dubbed "Calma U."

Seated at display terminal, an architectural designer can construct an entire factory in simulation and, in 1/60th of a second, zero in on certain manufacturing systems for closer examination.



Below: Calma systems literally can "iron out" design problems. This GE Light 'n Easy® hand iron was engineered on Calma equipment, using computer-aided design that helped assure high performance before production began.



"paperless factory" revolution now sweeping the corporate world, we offer a faster, more versatile and less error-prone way to get things done.

Calma entered the interactive graphics market in 1970 as a supplier of automated drafting systems — six years after its incorporation. In 1971, it delivered its first commercial CAD system, for designing silicon chips. The customer who bought it is still using it. Every system we ever shipped is still doing useful work.

There's a saying in our fast-track industry that "the future belongs to those who get there first." Calma has had its set of "firsts." We offered the first on-screen "menus" for telling computers and software what to do, and the first edit-in-place features. Ours was the first multi-color raster display — which greatly boosts design speed and accuracy. And we pioneered in three-dimensional modeling.

Talkies® were introduced in 1980 — the first CAD speech-input chip design system available. No longer must operators punch input keys. They can control the Chips® design system simply by talking, keeping their hands and eyes free for other tasks. The system "learns" an operator's voice, language and pronunciation patterns. It even can operate in foreign languages.

We incorporated this voice-input system in our powerful new Vector Memory Display terminal, introduced last year. Seated at this console, an electronics designer can create a chip four times faster than was previously possible. In the fast-paced chip race, this is extremely important.

Calma soon will introduce a symbolic design product which can improve a chip designer's productivity by 900%. A semiconductor company could quadruple its integrated-circuit production, because this system eliminates many currently necessary steps in chip design.

Calma's breakthroughs in CAD/CAM signal its importance in the new era of microcircuitry and automated manufacturing.

Using Calma systems, engineers and draftsmen are doing things they couldn't possibly do before. They're assembling parts in simulation, rotating the parts for views from other angles, checking for clearances and tolerances, and using the same data base to create parts programs to make the components.

In 1/60th of a second, drawings can be scaled up or down for minute study. The designer can tell the system, "Split this image and magnify the right side," and the system will automatically do it. If dimensions overlap or fall

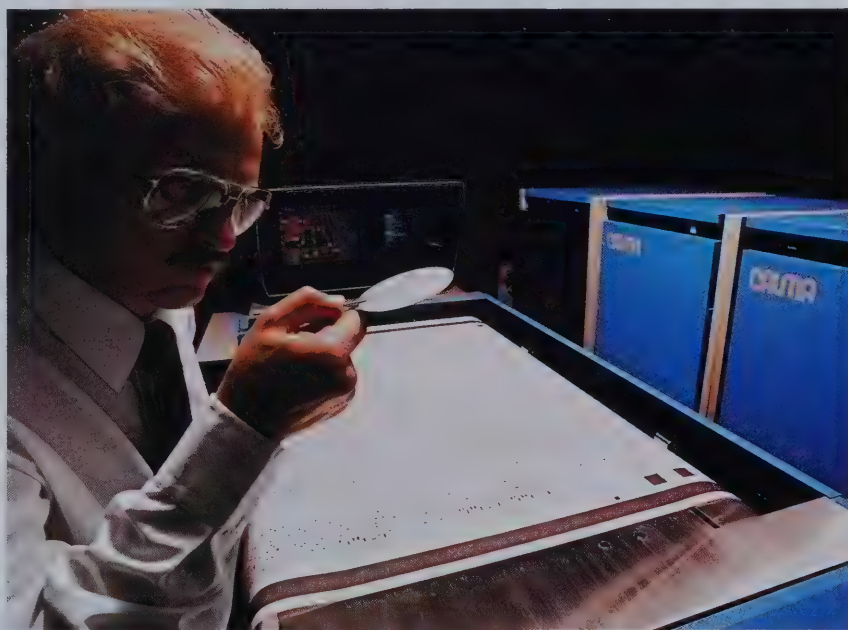
with solid shapes.

And we have formed a division to serve architectural, engineering and construction businesses.

As a company, we simply have to feel very optimistic about our future. A 40-45% annual sales growth rate over the next several years seems reasonable.

Our systems are an integral part of the GE quest for the "factory of the future." The latest Calma installation for GE recently took place at Distribution Equipment Division in Plainville, Conn. In the 1980s, a combination of Calma's CAD/CAM expertise and GE's manufacturing know-how should produce a superior approach to automated systems.

— Rebecca Costa



short when drawings are placed one atop the other on the screen, errors are obvious.

Calma's mechanical division was the first to develop the "model-to-drawing" concept — which allows operators to work interactively with three-dimensional models on a graphic display and take those models to production drawings *in a single step*.

We soon will introduce a solids-modeling system that will enable designers to work directly

Calma's mission is to free highly trained employees from tedious, time-wasting tasks. In producing silicon wafers, for instance, the greatest gain to be made is in improving a designer's productivity by eliminating errors.

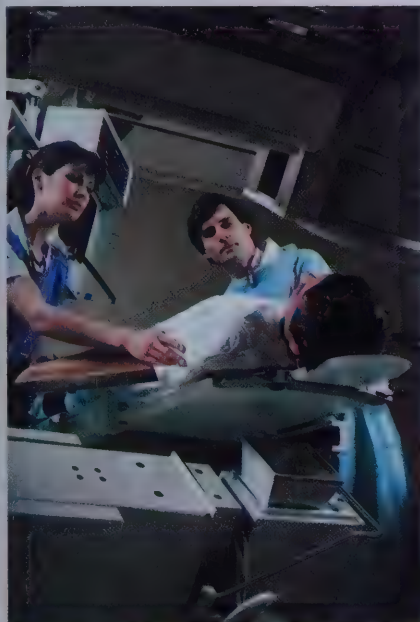
Time-exposure picture illustrating the complex motions of GE's new L/U-Angio X-ray system was achieved by mounting small lights on system's "U" arm. The system offers almost unlimited viewing angles of body.



Medical Systems: now, the era of 'high-tech' X-rays for patients



For 85 years, General Electric Medical Systems has staked its reputation on its foresight — anticipating medical diagnostic needs, then designing innovative answers in advanced imaging equipment. Barry Belanger, a systems design engineer with GE-Milwaukee, talks about the Company's diagnostic imaging systems, including GE's newest: the L/U-Angio X-ray system, one of which recently was installed at Milwaukee's Froedtert Memorial Lutheran Hospital shown here.



Top: in hospital X-ray room, Milwaukee's Barry Belanger (right) and doctor discuss GE digital X-rays, which will soon be helping replace many risky catheterization studies.

Bottom: hospital staff readies patient for an X-ray exam.

During GE Board of Directors' tour of GE-Milwaukee facilities on April 23, the Board heard how digital imaging techniques, first developed for CT scanning, can allow doctors to obtain new information from high-quality X-ray images of anatomy.

How important are diagnostic systems? Pretend for a minute that you're the patient, and that the doctor must make a critical diagnostic decision affecting you. You're involved in an accident. Preparing for heart bypass surgery. Suffering from ulcers.

Today, a General Electric medical system is there to help. Emergency-room diagnostic radiography. Coronary arteriography. Or upper gastrointestinal (GI) exams. Whatever the equipment needed, we have it.

The latest example is GE's new L/U-Angio digital X-ray system. Using it, doctors can examine the circulatory system of the head and body with a much higher degree of ease and accuracy. The L/U-Cardio system, another version, helps diagnose coronary artery disease.

The patient never has to be repositioned. The L/U system uses a combination of "L" and "U" arms that provide almost unlimited viewing angles of the anatomy. Once patients are positioned on the table, there's no need to move them again. Only 3½ pounds of force are required to move the 3,000 pounds of equipment, so even the smallest technologist can do it in seconds.

In addition, any patient's position can be precisely duplicated later for further study, using LED (light-emitting diode) readouts of all arm angles. The operator simply sets the arms to the same values to get exactly the same view.

This is especially useful for doing post-surgical followups.

Emotion crescendos in a hospital emergency room. So when you're hurt and worried, any delay is a big concern. Every minute you wait seems like an hour; every hour seems like a day. When the technical staff does rush you to the X-ray machine, you want fast answers.

All of us associated with General Electric's medical diagnostic systems — from X-rays to computed tomography (CT), nuclear medicine to ultrasound — carry a special responsibility to the public. It's a wonderful thing for us to have a doctor examine our L/U-Angio X-rays or CT scans and say, "These images are so much better than anything we've ever seen before." On the other hand, it's a gut-wrenching experience to hear stories about heart patients, for example, who have had to return to the X-ray room and repeat the catheter hookup, dye injection and fluoroscopy. By then, the patient and the family are twice as concerned.

My mission, as a medical systems design engineer, is to make sure the job gets done right the first time. It's a good feeling to be part of a team that can make someone's life easier at a difficult time.

Today, the diagnostic imaging equipment industry represents a \$4.7 billion annual market which is highly competitive. We offer innovative imaging technology in every modality and, working with the corporate Research and Development Center in Schenectady, N.Y., intend to continue our leadership role. When a patient is able to leave the hospital sooner than expected — when a doctor gets an answer to a difficult diagnostic riddle — I want to believe that it was because GE medical equipment provided answers that helped solve their problems.

— Barry Belanger

Major Appliances: factory renewal will mean better products for consumers

Coming off assembly line in Louisville, every new GE dishwasher is carefully inspected. Robert Rutherford, quality planning manager for Major Appliance Group, monitors programs designed to assure a new and higher level of quality in all product lines.



Earlier this year, GE's Major Appliance Group initiated a three-year, \$38.6 million program aimed at both improving the quality and increasing the productivity of its dishwasher manufacturing. Like the earlier changes in refrigerator manufacturing to facilitate the move to foam insulation, the dishwasher-plant modernization is in line with the Company's objective to make Appliance Park in Louisville the most productive, innovative major appliance plant in the world. The strategy: invest in new equipment, new technologies and new design changes for all products.

Robert Rutherford, above, discusses the ambitious undertaking.

We've seen the impact the Japanese have had on the U.S. automobile industry — now they're entering the domestic major appliance market. To continue as a

leader in the marketplace, we must build superior products.

Quality doesn't just happen. You have to plan it, then you have to be vigilant in implementing the programs you've planned. It means improving designs and features in our products, it means applying advanced production technologies, and — most of all — it means employees acquiring a state of mind that stimulates every member of the team.

Back in January, we held a giant rally to announce our dishwasher-facility renovation. More than 1,700 dishwasher employees heard the governor of Kentucky, the president of the IUE local and GE's Senior VP and Group Executive Richard Donegan pledge their united support in this drive for excellence.

Already, our people are having more say about their work. We have 35 Quality Circles operating at Appliance Park. A Quality Circle is a small group of people, normally eight to ten, from the

same work area who meet weekly to sharpen techniques and identify and solve problems experienced at their work stations.

Besides our emphasis on people, another element in product excellence is technology — innovations in products and processes. We're now converting electromechanical components to electronic ones. We're a big user of silicon chips and microprocessors in quality assurance. We use such space-age devices as lasers for better and faster welding. And our Group accounts for more than 50% of the industrial robots used throughout GE.

We believe the 1980s will hold more challenge and change than any decade in the history of this industry. Our mission is to enhance GE's consumer image. If we accomplish that, everything else — sales, earnings, market share, consumer and employee pride in our products — will follow

— Robert Rutherford

Television: quality helps GE move up in market position

The "big picture" in television today is its growing potential as a plug-in device for home entertainment and educational uses. Right: new GE microelectronic assembly technique provides precision bonding to boost TV reliability. Below: "life" testing of TV sets for up to 2,000 hours subjects sets to above normal voltages, temperatures and on-off cycling.



Portsmouth's Fred Aaron, above, observes that, in the 1980s, new TV attachments — two-way cable TV, home computers and satellite antennas — will harness the TV set for many other educational and informational jobs.

Color television suddenly is a "growth" industry — again. In 1980, General Electric moved up to number three among color set brands, as the result of a seven-year plan to rebuild its product lines from the bottom up. Fred Aaron, manager of quality control at the Television Division in Portsmouth, Va., comments.

It used to be that if you enjoyed high-fidelity sound, you had to go to your radio or record player — forget your television set. That's no longer true. TV sets now include hi-fi amplifiers. It's a change that characterizes what is happening in the television industry.

Another big area of change is in what you can plug into these sets. People aren't looking to their TVs just to bring in network "sit-coms." They're using videocassette recorders to tape programs they'll want to replay. They're using TV screens to play electronic games. They're starting to use videodisc players to run their own favorite movies.

The standard television set is becoming a full-fledged home entertainment and communications center. Already, these sets display dozens of cable-TV channels and pay-TV programming.

With video equipment, they'll enable viewers to decide *when* as well as *what* to watch.

So it's an exciting industry to be in. And GE's climb to prominence in the color TV industry puts us in a better position to enjoy what's going on. We earned this new position as a reward for seven years of hard work — work at making GE color television receivers more reliable, more innovative, a greater value.

Quality like that isn't a gift from the tooth fairy. At Television Division, we're emphasizing a total commitment involving employees, manufacturing techniques, our designs and materials.

"High-tech" innovations can be found throughout our models. Over the last five years, we have cut our in-warranty TV repair rates for both color and black-and-white sets by 50%.

General Electric's TV sets today are second to none. Now, we plan to give a repeat performance in the market for TV add-ons. The home entertainment and information systems market could build from less than \$10 billion in annual retail sales today to over \$20 billion by 1986. There's a huge opportunity opening up, and we plan to be there as a leader.

— Fred Aaron

Steam Turbine-Generator: GE's 'new electronics' watch over station operation

Computerized video display terminal at Spurlock Power Station near Maysville, Ky., interfaces with GE's new ATSI system used to monitor and control steam turbine-generators. Sensors inside the turbines feed constant data on the units' operation.



GE's Dan Crawford stands in Spurlock turbine bay where ATSI sensors are employed. The GE system receives an analog signal from the turbine, changes it to a digital signal, runs the signal through a micro-processor, and then transmits the information to terminals in the control room.



The steady growth of electrical power usage has, at least temporarily, become a thing of the past. Today, such factors as inflation, legislation and fuel prices have caused many utilities to seek ways to provide electricity through higher operating efficiencies and lower operating costs. Dan Crawford, a Cincinnati-based service supervisor for GE's Installation and Service Engineering Division, talks about GE technical innovations now enabling utilities to alter their strategies.

Our utility friends may be experiencing a slowdown in the traditional growth of their industry, but this *doesn't* suggest any slowdown in their need for research and development. In fact, General Electric scientists and engineers at Schenectady's Turbine Group and the corporate Research and Development Center are working night and day to satisfy utilities' appetite for efficiency-related technical advances.

A typical modern large steam turbine-generator, it may be pointed out, contains 360,000 parts. Turbine blades whirl at 3,600 revolutions per minute. The standard operating life of a plant is over 30 years.

With electric-bill-paying customers increasingly conscious of the effects of energy costs on their pocketbooks, the utility industry is eagerly pursuing ways to boost output while holding down rates.

One "high-tech" offspring from our development effort is the General Electric advanced turbine supervisory instrumentation (ATSI) system now in place at the 880-megawatt Spurlock Power Station in Kentucky (at left).

Installed this March in conjunction with Spurlock's newest GE turbine-generator unit, this computerized ATSI system is an early-warning monitoring device that alerts station operators to excessive turbine vibration, and provides the turbine's speed, temperatures and overall status.

Also outfitted on this new GE unit is a rotor stress indicator, designed to optimize turbine rotor life by guiding station operators during turbine startups, shut-downs and load changes.

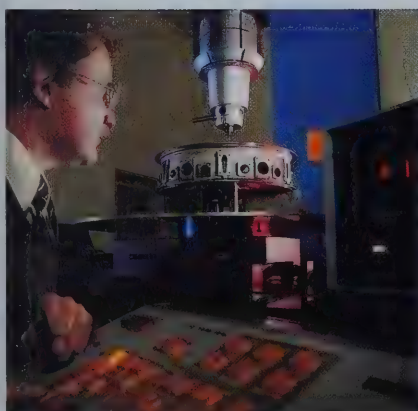
If you think about it for a moment, a parallel to the electronic "factory of the future" can be found in the modern electric power generating plant — equipped with these GE advanced electronic systems for monitoring and control. In the 1980s, we envision further progress. Our ATSI and rotor stress indicator systems — along with our current solid-state Generex[®] excitation system and our new turbine automatic control (TAC) system — as a "package" will offer utility customers unprecedented operating performance.

— Dan Crawford

Aircraft Engine: computers, engineers team up to improve GE jet engines

Aircraft engines are tested by operators employing sophisticated consoles at GE-Evendale — such as the CF6-80 jet engine seen on this video screen, undergoing a performance test. GE's David Brandt stands at right.

Below: a computerized measuring machine for quality control is accurate to 1/10th the diameter of a human hair.



Anyone who chooses to ride a General Electric-powered aircraft today benefits from engines that are quieter, virtually smoke-free, more energy-conserving, and manufactured to more exacting standards than were previously possible. One reason for this progress is the use of computers in designing GE engines and in manufacturing and testing them. David Brandt, manager of technical support at GE's Evendale, Ohio, plant, explains.

Around the clock, hardly a minute goes by when there isn't a GE-powered jet taking off. Over the years, GE has produced more than 85,000 aircraft engines. We want to keep on giving customers engines that are better, more reliable, more energy-efficient.

One of our biggest aids in doing this job today is the computer. With computers we can do things more accurately and more economically than was possible with manual methods. Further, we

can do things that couldn't even be attempted without their aid.

Computer-aided engineering, for example, allows us to design with far more complex geometry and accuracy than is possible on a drafting board. A GE designer in Evendale or at our facility in Lynn, Mass., can use interactive graphics with video displays providing three-dimensional views of an entire engine or a single part. By using these images, we can check for tolerances, interferences and clearances before the design goes to manufacturing.

In GE engine manufacturing, computer-aided machining has reached the point where one computer can now control 100 machine tools. Teaming up computers and engineers helps us spot machining errors and cor-

rect them in the "software" stage rather than later when expensive parts could be destroyed using cut-and-try test methods.

Productivity is also improved. Computer-aided design and manufacture have boosted machine usage and reduced the amount of metal scrap and rework. For example, one of our computerized inspection systems has raised productivity in its area by 3,000%.

Testing is another operation done better through the use of computers. We can gather 1,000 different bits of data about an engine — temperatures, pressures, vibrations, etc. — and feed this information into a computer. It will accept up to 10,000 measurements a second, store this information, analyze it, "convert" it and display it on a screen.

Engineers armed with modern computers — it's a combination that is helping us keep GE in the forefront of engine technology.

— David Brandt

Creative money management

That's the special expertise by which General Electric Credit Corporation has transformed itself into America's largest diversified finance company — and in 1980 contributed one in every 13 dollars of GE earnings.



Why buy a car? Try leasing one

The U.S. is seeing an accelerating trend toward leasing automobiles rather than owning them. Until the last few years, though, leasing programs weren't available to the consumer who wanted to lease an imported car. It's a marketing gap that GECC's subsidiary, General Electric Auto Lease, Inc. (GECAL), has been swiftly plugging, by providing comprehensive leasing programs that dealers can offer their customers. Today, domestic auto dealers are also participating in GECAL programs in increasing numbers.

Words such as "innovations," "product development" and "new products" are commonly associated with manufacturing operations. But a reporter who circulates among the people of the General Electric Credit Corporation soon becomes accustomed to hearing these terms applied not to finite goods but to financial services. To employees of GECC, a "new product" is an innovative form of credit financing not previously available. They see money management as just as fertile a field for invention as is a physical science.

This creative, innovative spirit is a distinguishing characteristic of General Electric's wholly owned finance affiliate. It's a spirit that has been building over the past 20 years. In that period, GECC has transformed itself, via innovations, from a one-function in-house credit arm to the largest diversified finance company in the continental U.S. — and in Puerto Rico and Hawaii as well.

In 1980, GECC increased its earnings 28% to \$115 million — well over a quarter of the earnings of its corporate parent, Consumer Products and Services Sector, and nearly one in every 13 dollars of GE earnings for the year.

Formed in 1932, GECC for its first 27 years served the sole purpose of helping to boost sales of GE major appliances by providing inventory financing and consumer credit services to GE dealers. And it did well within this narrow specialty: receivables grew from \$4.3 million in 1933 to \$441 million in 1960, and net income rose from a \$45,000 loss in GECC's initial year to 1960 earnings of \$7.3 million.

During that pivotal year of 1960, however, GECC's management decided that the Corporation's growth opportunities would be limited if its activities were restricted to appliance financing. In a recent talk to financial analysts, GECC President John W. Stanger disclosed the reasons for this conclusion:

"Consumer markets were changing. Growth of discounters



Credit financing, Japanese-style
GECC's innovative consumer services
have now gone overseas. Formation in
April 1980 of Toshiba-General Electric
Finance Corporation, a joint venture with
Toshiba Credit Corp., brings GECC-style
financing to Japanese consumers. Are
the Japanese taking to it? Growth of the
new venture during the first year ex-
ceeded all expectations, and new offices
are extending the venture's reach to ad-
ditional areas of Japan.

and other independent major appliance dealers was one factor. Others included the rising cost of money, more aggressive competition from banks, and growing consumer credit regulations. All of these factors combined to put the handwriting on the wall: GECC either had to diversify into other areas of financing or it would soon die."

The decision was made: the Corporation would move into new financing services. "For a while," Stanger recalled, "we clung to the notion that whatever we put money into had to be related, in some way, to a GE product. And some of us stretched that rationale as far as it could be stretched. I remember one financing deal, involving \$500,000 in construction equipment, where the only GE products in the whole deal were the lightbulbs in a bulldozer's cab."

Soon, though, GECC managers went beyond these self-imposed limitations. One way was to extend the Corporation's original appliance financing business by offering retail credit to non-GE dealers and to other retail product areas, such as furniture businesses. These were successful moves that built GECC's Home Products Financing Department's receivables to well over \$1 billion in the years that followed.

Once the creative spirit was unleashed, it quickly found radically new outlets. In 1960, the Corporation's Commercial and Industrial (C&I) business was founded to provide equipment sales financing for construction and mining equipment, machine tools and trucks. New products developed for these markets soon generated another billion-plus in receivables.

C&I kept branching out in new directions. In 1966 it moved into large-balance lease and loan financing, with a \$35 million interim loan to the Boise Cascade Corporation. And the following year, C&I introduced an innovation called "leveraged leasing," by which GECC and an institutional lender such as a bank or insurance company share in investing



Home Sweet (Manufactured) Home
 What were once "mobile homes" have now become "manufactured housing" — and the difference is more than just words. By cleverly designing modules or self-contained sections that are shipped separately but combined into single dwellings, the industry now offers homes that are virtually any size the buyer wishes. GECC's Residential Financing Department helps by offering innovative financing programs. Result: viable, affordable alternatives to traditional housing.

in a major asset which is then leased to the user. Commercial and Industrial's first leveraged lease was with Allegheny Airlines for three DC-9 aircraft. Leveraged leasing ends up benefiting all participants — serving as a good investment for those who put up the money, while allowing the equipment user to conserve capital to meet other needs.

From these beginnings, C&I has grown into a Division that has involved GECC in such magnificent possessions as ocean-going vessels — the fleet of tankers and other marine vessels owned by GECC represents the largest tonnage of U.S.-flag vessels under one owner; and railroad rolling stock — GECC's 40,000 pieces of railroad equipment on lease are enough to make up a train stretching from Boston to Baltimore. As for aircraft, by the end of 1980 GECC owned 93 jetliners leased to major carriers — a fleet that, if it were operated by GECC, would place the Corporation among the leading airlines.

Another new departure for GECC came in 1963, when a new component was formed to handle the financing of mobile homes. This step laid the groundwork for participation in today's "manufactured housing" industry, as summarized in the separate profile at left.

The year 1970 was one of major new ventures. A new Commercial Loan Department was organized to make loans secured by both business and consumer receivables. The Department also began providing private-label credit-card services to retail chains — in effect, operating the chains' credit-card business.

In that year, too, GECC entered the real estate financing business which, in 1980, was organized into Real Estate Financial Services Operations, with receivables exceeding \$1.9 billion.

Also in 1970, GE Credit added its first insurance company, Puritan Insurance, whose original function was to provide property and casualty coverage for products financed by GECC. Since



Rent-an-airplane

Will it come to the time when customers will rent business aircraft the way they now rent automobiles? The time is already here. The STAR (Short-Term Aircraft Rental) program offered by GECC's Commercial Equipment Leasing Department is growing by leaps and bounds. GECC's involvement in air transport is varied — from owning and leasing 93 jetliners to financing business jets and commuter aircraft.

then, Puritan has "gone public" with its offerings and built its net earned premiums to \$62.7 million. In 1973, GECC followed up by acquiring Puritan Life Insurance Company, which today ranks among the top 10% of U.S. individual life, credit life, and accident and health insurers.

Financial innovations by GECC have continued at a fast pace. As shown by the business profiles accompanying this report, new products conceived by the Corporation's specialists have thrust GECC into automobile leasing, aircraft rental, and the extension of GECC-style service to Japanese customers.

GECC's Executive Vice President and Chief Operating Officer, Lawrence A. Bossidy, adds a perspective on the ability of the Corporation's experts to come up with new financing packages:

"Our people succeed by knowing in great depth the markets they serve. If there is a secret to our success, that is it: the informed professionalism of our field specialists who know their industries and their markets so thoroughly that they are first in coming up with new ideas that will solve financing problems of their customers."

Thus, step by step, innovation by innovation, General Electric Credit Corporation has progressed away from its original narrow base. Today, with 16 discrete businesses, GECC is a widely diversified, world-class financial services organization, with earning assets totaling \$8.9 billion at year-end 1980.

Over the past five years, GECC has averaged an annual growth rate in net income of 18%. At a 1980 meeting of GE share owners, the ultimate acknowledgment of the parent company's appreciation of its fast-growing, profit-making affiliate was voiced by John F. Welch, now GE Chairman and Chief Executive Officer: "GECC is one of the most exciting parts of the General Electric Company," he said. "It is clearly one of the high-growth businesses for General Electric in the next decade." □

INVESTOR

GENERAL ELECTRIC

Volume 12 Number 2 Summer 1981

The *Investor* is published by the General Electric Company to inform share owners and investors about the Company. Others may receive the *Investor* on request.

Editor: Linn A. Weiss

Associate Editors: Devere E. Logan; Edna Vercini

Editorial Board: Frank P. Doyle, Vice President-Corporate Employee Relations; Frederick N. Robinson, Manager, Corporate Editorial Programs; John L. Ingersoll, Manager, Corporate Investor Communications

Art Direction: Jack Hough Associates, Inc.

Cover: Phillip Harrington

Photographers: Stan Blanchard, John Blaustein, Garry Burdick, Wayne Lennbacker, Russell Ley, William Strode, Tom Tracy

Note: GENERAL ELECTRIC and GE are registered trademarks of General Electric Company. ® and ™ indicate registered and unregistered trade and service marks of General Electric Company. © 1981 General Electric Company, Fairfield, Connecticut 06431

GE adds 'sight' and 'feel' to automation



To lift factories out of the doldrums and lop years off design, engineering and manufacturing cycles, General Electric has embarked on a program to develop, use and sell advanced automation systems and components. The "factory of the future" envisioned by GE will be achieved through a building-block approach, linking "islands of automation" to close the loop for an advanced manufacturing system.

One "island" link is GE's Opto[®] II Instrument System (above). Its solid-state camera and computer-based decision processor bring electronic vision to the automated factory — giving intelligent "sight" to robots.

Electronic "feel" also is being brought to the automated factory with GE-equipped robots (right) that "sense" an object's size and movement. The Company is assembling and selling the Allegro[®] robot system under worldwide license from Italy's DEA company.





A leader in today's business world is the company that encourages people's self-growth. GE is taking the necessary steps to ensure it hires and retains its share of bright people.

alize the Company's microelectronics activities and speed the "factory of the future" into reality.

To sharpen the thrust in services and materials, a new, growth-focused Services and Materials Sector, headed by newly elected Executive Vice President Lawrence A. Bossidy, was formed. In addition to its fast-track Information Services Division and Engineered Materials Group (see stories, pages 11-15), the Sector includes GE Credit Corporation, offering opportunities for new financial services. Business Development Services, Inc., GE's wholly owned venture capital subsidiary, also has been repositioned into the Sector to better align "high-tech" investments with the Sector's growth-oriented strategy. Bossidy, who possesses a demonstrated business-growth orientation, will drive to accelerate the trajectory of these dynamic businesses.

A restructured Industrial Products Sector, headed by newly elected Executive Vice President Louis V. Tomasetti, includes the Contractor Equipment Group, Motor Group, Transportation Systems Operations and GE Supply Company. Tomasetti brings broad business experience and special expertise in manufacturing and marketing to this group of businesses and to the industrial markets they serve as U.S. industry begins to replace and modernize its productive capacity.

To implement the services strategy within the Power Systems Sector, a new Construction and Engineering Services Group, led by Senior Vice President John A. Urquhart, brings together Installation and Service Engineering, Apparatus Service, and the Sade/Sadelmi Construction Operations headquartered in Italy. The Group will pursue a worldwide strategy of enhanced construction, engineering and service support in growing world markets.

The Aircraft Engine Group has been repositioned out of the Company's Sector framework and into a direct reporting relationship to GE Vice Chairman Edward E. Hood, Jr., thus bringing increased top management attention and continuity to this



People-relevant innovation represents a cornerstone for future GE success. The company that produces high-quality products, that serves people's changing needs and makes their lives better, will have the advantage.

high-technology business. This closer link with the Corporate Executive Office will provide quick responses to market changes in this volatile, high-investment business.

An emphasis on people. Discussing the new organization, Chairman Welch stresses the flexibility of the Company's management structure and the extent to which business success for General Electric in the 1980s depends on having *quality-oriented people* throughout the Company.

Because the pace of change is accelerating, GE is striving to move faster than the pack in structuring its businesses to be sure they are on the leading edge of every chosen market. This imperative is the driving force behind management selections, which require choosing people "who can marry their products and services with changing markets, who understand the coupling of the market niche with inherent GE strengths, and who possess the will and drive to make it work."

The interactions of quality-minded employees and technology are a source of great Company strength. General Electric is a big company, vested with all the basic resources that are needed for growth. But it also is made up of many small businesses, each of which possesses the agility and opportunities for entrepreneurship that exist in fast-growing small companies.

That is why the flexibility of the GE Sector organization structure is seen as advantageous – it affords GE people the opportunity to become general managers of small businesses relatively early in their careers, and to grow those businesses to their full potential.

To this end, General Electric continually strives to attract, set a climate for, and motivate its people to grow and capitalize on all of the resources the Company can provide them.



Filming of a new series of 'We bring good things to life' TV commercials is under way. Beyond simply an advertising campaign, the theme is a Company mission statement, the marriage of GE technology and marketing. GE is encouraging its employees to make General Electric the label of quality.

People-relevant innovation. Technological advances that are in tune with the marketplace represent another cornerstone for General Electric growth in the '80s, the Chairman points out. The company that provides valued products and services, that serves people's changing needs and makes their lives better, will have the advantage.

The coupling of quality-driven technology with customer needs spells growth, he says. "During this decade, I want General Electric to significantly outpace the growth of the Gross National Product. To help us reach that goal, we will build upon a set of underlying GE values – quality, personal excellence, commitment, a creative ambience."

Today, with the "We bring good things to life" advertising theme, the Company is putting a renewed emphasis on something that has always been a hallmark of GE – the commitment to excellence.

"As a company, our focus is on people – not simply products," observes Chairman Welch. "In today's society, where customers are increasingly searching for lasting values in what they purchase, we want people to know they can count on General Electric. We want to be known as the company that *makes things happen*."

"In the fast-track 1980s, General Electric has a unique advantage in accomplishing this goal," he comments. "We have big Company resources to provide unifying solutions to complex business problems. At the same time, we are positioning our organization to be able to act with the speed, decisiveness, knowledge and entrepreneurship of a small enterprise."

The GE Board Chairman sums up his long-term outlook for business growth at General Electric with two words: "Never better." And he quickly explains why: The Company has the resources in place. The brick and mortar. The technological base. The marketing strengths. The financial resources. And most important of all, General Electric has outstanding people who know their businesses. □

Creating new building blocks

An 'in progress' look at three hot growth areas — microelectronics, information systems and engineered materials — shows GE's drive for technological excellence.



The ubiquitous chip — ushering in GE's future

7

Obtaining the tiny integrated circuits, or chips, that are key building blocks for thousands of future General Electric products — including those needed in the advanced industrial systems of the "factory of the future" envisioned by the Company — is a prime corporate objective.

By the mid-1980s, two-thirds of GE sales will be impacted by the electronics content in its diversified product lines. The chip is GE's passkey to product leadership.

If industry predictions are true, factory automation will grow tenfold to a \$25 billion equipment market by the end of this decade — about the size of General Electric today. Using microelectronics-based technologies, GE plans to be a significant participant in that dynamic market.

GE is shoring up its "high-tech" resources. To get a broad capability in semiconductors, it has acquired the California-based Intersil, Inc. It also has purchased a California neighbor, Calma Company, a pacesetter in interactive graphics equipment, whose systems are critical to the design of advanced chips for factory automation products.

GE also is building a new Microelectronics Center in North Carolina, where advanced electronic devices will be designed and produced for use in Company products. A major expansion program is under way at the corporate Research and Development Center in upstate New York, mainly for semiconductor and electronic-materials research that will lead to new chips and products. And, in Virginia, a new Industrial Electronics Applications Lab is being built to help accelerate GE's plans for the "factory of the future" in which modern industrial control concepts will be applied.



A 'data highway' linking all the various General Electric automated factory components — numerical and programmable controls, industrial robots, etc. — into an advanced industrial system is a key Company goal, observes James A. Baker, GE Executive VP and Sector Executive of the Technical Systems Sector.

Baker, whose new job encompasses GE's consolidated electronics businesses, notes: "GE already has islands of automation in many of its factories. By 1990, we expect to tie these chip-based islands together through host computers and enable our nation's industries to have completely automated factories."

By then, GE expects its sales of industrial electronic products to increase handsomely, up from \$1 billion currently.

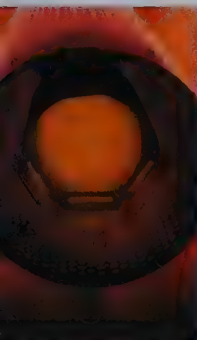
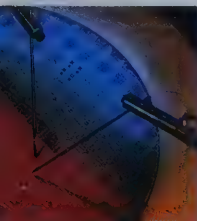
A central vehicle for helping realize this revenues gain is the GE Information Services Company (see story, pages 11-13). Its resource-planning system, called MIMS®, ties in with GE's overall thrust in plant automation, providing communications links between plants and engineers on a worldwide basis. "For the 'factory of the future,' networking is the key," Baker points out. "GE Infor-

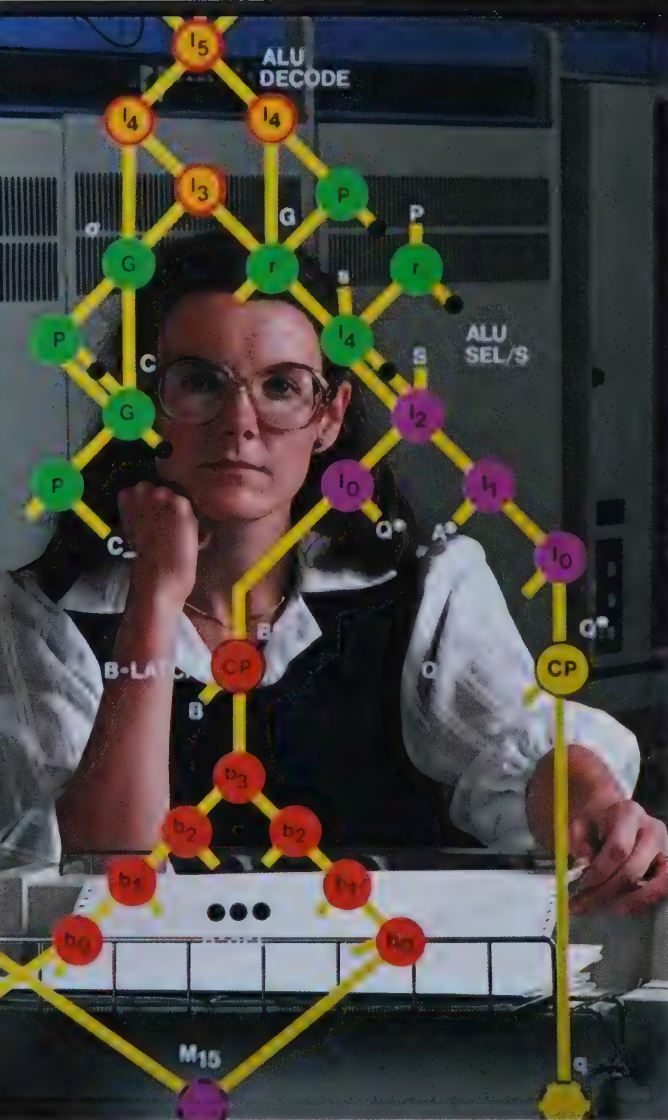
New GE Microelectronics Center under construction in North Carolina's Piedmont region will help assure the Company of a ready supply of custom integrated circuits for its increasingly sophisticated products and automation systems.

Far left: a glimpse inside an epitaxial reactor at Aerospace Electronic Systems facility in Utica shows production of silicon wafers — each of which will have hundreds of tiny chips. A thin epitaxial layer of silicon is being "grown" on wafers, the building material that eventually will receive chip image.

The facility will work closely with the Microelectronics Center on chip development.

Left, from top: product engineer Kathleen Siegenthaler loads epitaxial reactor. A wafer receives quality check with the use of microcircuitry probes. A plasma barrel reactor "dry etches" wafers to selectively remove a thin surface material, thus leaving chip image.





mation Services' form of networking represents the wave of the future, and should provide highly profitable opportunities for this GE affiliate."

He continues: "GE is a major world supplier of electrical and electronic products and services for industry. Many of our facilities now are serving as 'laboratories of automation' to help achieve further advancement."

Across the Company, a \$300 million Microelectronics Program has been initiated, Baker reports, that will integrate the efforts of GE's Electronics Lab, Solid State Applications Operation and Aerospace Electronic Systems Department – all having new lab facilities – with the new Microelectronics Center and corporate R&D Center.

"The Program's aim," he says, "is to carry General Electric into the ranks of the advanced microelectronics producers by 1985. Our commitment is long-term. GE's vast installed base of products means it has a core understanding of many different types of manufacturing enterprises. Looking ahead, we see our *competitive edge* at the *leading edge* of the new technology."

Research Triangle Park – on 6,000 acres at the center of a North Carolina "triangle" formed by Durham's Duke University, Chapel Hill's University of North Carolina and Raleigh's North Carolina State University – will become home for the new GE Microelectronics Center.

Occupancy of the 145,000-sq.-ft. GE facility is slated for December 1. First chip production is scheduled for mid-1982.

Situated in a campus-like environment on gently rolling land covered with yellow pine and oak, the \$60 million Center will include a combined laboratory-production facility, technical support building, offices and a services area. Its eventual output will be 20-30 million custom chips an-

nually for GE internal use.

"This facility, in every sense, is to be a *center* for GE custom microelectronics work," states Donald S. Beilman, VP and general manager of Advanced Microelectronics Operations. "The Center will be directly involved with GE product departments, which will have product design teams on site. It will play a 'partner' role in coordinating other GE components' semiconductor and software work."

Beilman continues: "We see our *systems approach* to microelectronics – afforded us by our great diversity as a company – as a unique advantage."

This 'GE difference' is viewed by General Electric managers as a big "plus" in obtaining highly sophisticated one-micron-level chips by 1985.

"The Company has a lot of catching up to do in integrated-circuit technology – that's true," says GE's James E. Dykes, VP and general manager of the Microelectronics Center. He notes: "A major GE strength is its size and breadth. We see a trend toward more 'captive' chip companies, producing circuits for their parent companies' products as well as for the merchant market."

Dykes says that the GE approach is a *focused* one and that "the Microelectronics Center does not intend to compete against other chip makers on high-production standard chips. In fact, we will be buying more standard chips than ever before. But we *must* have increasing numbers of custom chips."

The new GE chips will be aimed at various internal product lines, including mobile radios, medical diagnostic systems, data communications equipment, and aerospace, industrial and consumer products.

The facility will concentrate on integrated circuits made with a complementary metal-oxide semiconductor (CMOS) process



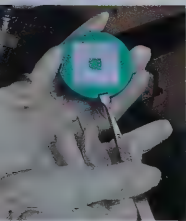
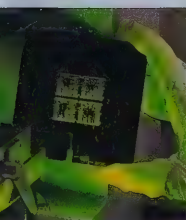
A "planetary" containing silicon wafers is placed inside metal sputtering machine at Syracuse's Solid State Applications lab by process engineer Jeffrey Lahaye. This metallization step applies thin aluminum film which, after additional steps, electrically connects the wafers' various chip parts.

The lab will play an integral role with GE's Intersil and Microelectronics Center in developing chips.

Far left: at Electronics Lab in Syracuse, engineer Suzanne Siegel works on complex circuitry for new GE chips.

The binary decision diagram (foreground), conceived by E-Lab's Sheldon Akers, may offer new way of verifying a digital network's "architecture" — important in dealing with modern chip complexity.

Left, from top: at E-Lab's Monolithic Microwave Facility where new chips are being developed, a "mask" design is projected onto a wafer (center) to give it its chip image. Beforehand, wafers are coated with photoresist, a light-sensitive material that enables them to accept mask designs.



for in-house use — and to gain added flexibility, it also will employ what is called, in industry lingo, N-channel, bipolar and, eventually, high-frequency bipolar processes.

Dykes notes: "A first-class plant such as the one GE is building is the only way to go, if we want our products to stay competitive. We need a topnotch facility to get to the forefront of very-large-scale-integration (VLSI) technology."

The facility is being built, from the ground up, for one-micron geometries. To achieve this fine degree of perfection, GE is using, among other things, "waffle" concrete floors in its chip lab that has column isolation to minimize vibration. Huge air and water filters with recycling systems also are being employed.

Brilliant minds and specially trained people are the principal resources of the chip industry, Dykes asserts. "We are determined to hire our share of the high-tech people. By 1985, GE intends to progress to very-high-speed integrated circuits

(VHSIC), with 100,000 'gates' or circuits on a chip. Recruiting the people who can reach this goal is vital."

GE purposely sited its Microelectronics Center in Triangle Park because of the Park's proximity to three major universities, the state's natural beauty and the relatively low cost of living.

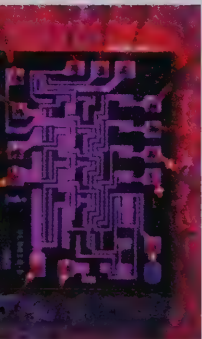
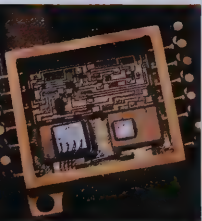
To bring the best nationwide college and experienced talent to the Company, GE is interviewing at key universities across the country, has initiated a national advertising program and campus media effort, and is providing summer positions with GE components for top college students.

Dykes notes that, over the next five years, "GE expects to spend more than \$100 million on the Center. By 1985, it should employ 500 people. Already, some employees are at work at its temporary rented quarters, doing computer-aided design work using GE's Calma equipment."



Powerful lasers in the future may help fabricate very-high-resolution microcircuits as a result of current studies at Schenectady's R&D Center. The Center is responsible for long-range research on the one-micron chips which the Microelectronics Center will produce.

Left, from top: a human blood cell is shown for size comparison with an "air bridge" on surface of tiny chip. GE hybrid devices — with chips mounted on their substrates — now find their way into many communications products. The Intersil chip family will be a key building block for the automated "factory of the future."



To be a product leader in the microelectronics arena, GE also must be a *technology* leader, asserts Roland W. Schmitt, VP of Corporate Research and Development. "This means that we have to understand *all* the technology and take the lead in areas that will be of maximum value to the Company."

At the corporate R&D Center, focal point for the Company's long-range research effort, electronics scientists and engineers are investigating advanced materials and processes — things such as reactive ion beam etching and two-level photoresists — in an effort to further reduce the size, and thus cost, of the already tiny microcircuit. The Center also is working to extend the power of the computer as a tool for the design of these ultra-complex devices.

To cover all bases, GE now is upgrading its semiconductor processing operations:

► In Schenectady, where a \$58 million expansion program is being completed at the corporate R&D Center, a CMOS process to make one-micron devices — the ones that the North Carolina facility will start producing in 1985 — is now being developed. The Center recently finished development of an N-channel surface charge transistor process for advanced communication circuits.

► The Electronics Lab in Syracuse also is crucial to the Company-wide effort. E-Lab is devising the architecture and software essential for integrating VLSI chips into future GE products. Its new \$2 million Monolithic Microwave Facility will advance this technology in the areas of silicon, gallium arsenide and surface-acoustic-wave circuits and devices. Microwave-integrated circuits will heavily impact GE communications products.

► Also in Syracuse is the Solid State Applications Operation, which recently opened an \$8 million Programmable Process Facility for fabricating custom chips. This Operation is working closely with Intersil and the Microelectronics Center on CMOS and bipolar processes.

► In Utica, at Aerospace Electronic Systems as well as Advanced Microelectronics — in two new facilities that represent a \$5 million investment — silicon-on-sapphire chip development is under way, targeted for various military and tough environment uses.

► In Charlottesville, Va., a \$31 million expansion of the Company's Industrial Electronics facilities is under way, including a \$3 million Industrial Electronics Applications Lab to help develop the automated "factory of the future."

Applications of chips cut pervasively across GE product lines, sums up Executive VP Jim Baker. "No other company has all the building blocks we enjoy in upgrading our microelectronics capabilities. When we left the computer merchant market a decade ago, we retained our core chip design, process and production capabilities. We're building on this core talent by committing resources to hire the right people and construct the right facilities to meet today's microelectronics challenge.

"General Electric intends to be a *leader* in the microelectronics revolution." □

Information systems — a future 'core' business of GE?

There are roughly 1.2 million computers in operation in the U.S. today and by 1985 there will be 5.4 million, or one for every 42 Americans. Who is going to program them all? In the past 15 years, computing services — the programming and software, not the hardware — have zoomed up into an industry larger than broadcasting. Even at \$13 billion annual sales, these services appear to be in their infancy.

The packaged software segment of the computer services in-

dustry, according to International Data Corporation, the Massachusetts research firm, is growing 30% a year. In 1985, at that rate, packaged software would reach \$11 billion.

Forbes magazine in a July issue talked about the computer industry, citing computer services as "the growth industry's growth industry." It said software — not hardware — represents a good part of the future of computers themselves. A computer service company can do work more

cheaply than customers can do it themselves.

Today — thousands of companies worldwide rely on General Electric Information Services Company for help in solving computer-related business problems that range from order service to financial modeling.

Whether the customer's business is high finance or fast food, the company is providing solutions with an innovative combination of computing services.

"Change — no word better describes GE Information Services," states its president, Gregory J. Liemandt, a GE VP and general manager of Information Services Division. "Change in the marketplace, in technology, in competitors, in ourselves. Our expansion out of the traditional computer timesharing service into a much broader services market is not merely a key to the future — it is our future."

Liemandt notes that "a business-world revolution is taking root — in General Electric's 'factory of the future,' in office automation, in satellite communications and in custom software development, to name several. We are determined to win with change."

A bright growth curve is foreseen for GE Information Services. The company's estimated 1981 revenues will exceed \$½ billion for the first time in its 16-year history. Liemandt also observes that, based on both internal and external software development programs, Information Services has established a target to *triple* current revenues to \$1.5 billion by 1986.

Now a leading supplier of computing services, GE Information Services operates the world's largest commercially available teleprocessing network, which provides local-call access to more than 5,000 customers in 32 countries. Services include timesharing, batch processing, cus-



Curbing 'software illiteracy'

More and more companies today are afraid that if they can't "speak" the modern software language, they will become functionally illiterate. But they can't afford the rapidly escalating costs of the new software.

Here is where GE Information Services can help. It recognizes that the cornerstone of a more customer-oriented approach to computing services lies in the development of value-added applications by software specialists who can provide total solutions.

Four recent acquisitions of software consulting companies bring a total of almost 2,000 highly skilled programmers and systems designers to this GE affiliate.



tom software design, consulting, and distributed data processing — a technology that puts computer power in operating components, where business transactions actually take place.

"Value-added services represent our primary marketing strategy," Liemandt reports. "Demand has evolved from a need for 'raw' computing power to requests for software applications. These demands are increasingly complex. The rising costs of software reflect the complexity of these applications — software costs have gone up 15% to 20% a year."

He says that about one-third of Information Services revenues now come from raw power: "Our future lies with growth segments — value-added services — which last year produced the other two-thirds of our revenues."

By 1985, the business expects 90% of its revenues to come from such services. "This market is experiencing rapid growth and each service category is becoming much broader," Liemandt says. "Our services are being augmented by minicomputers, consulting centers, service centers, database services and licensing arrangements."

"Our intent is to propel Information Services into the mainstream of the software field," he explains. "We're at the heart of the information revolution. We could

become a 'core' GE business of tomorrow."

Attractive opportunities for software services abound, observes Arthur J. Marks, VP and general manager of the marketing department. "The problem is: how many shells do you pick up along the beach? Pick too many and you start dropping them."

GE Information Services is picking its prospects carefully. "Programmers, the human part of the software equation, are in short supply," Marks notes. "In the 1980s, some 90% of the cost of implementing a computer application will involve people and software rather than hardware. The current population of skilled programmers satisfies only 60% of the demand, so we must select projects for maximum return."

A great responsibility is borne by Information Services toward its clients, he comments. Even as the company broadens its service offerings to give added value to its products, it is determined to keep its *quality* reputation. "Many of the 'blue chips' of the corporate world rely on it for many sensitive operations."

Among several of the company's new software ventures:

- MIMS®, being used in-house with GE's "factory of the future" as well as being licensed. This packaged software is a resource-planning system that helps coordinate daily manufacturing activities, and integrates those activities with business operations such as engineering, finance and marketing.

- QUIK-COMM®, an electronic business communications system which can replace many phone calls, letters and filing systems. It uses host computers to create and distribute business correspondence electronically, and files documents for long-term reference.

- TABOL, a sophisticated computing language that is designed to make it easier for managers

'Library cards' for CAD/CAM users

General Electric's "factory of the future" depends on a unifying communications system that links the various automated industrial operations into a cohesive whole. Information Services is providing this "data highway" — including the ability to close the loop between users of computer-aided design and manufacturing (CAD/CAM) and the information they need to work.

It recently established a communications intertie with Calma Company, GE's interactive graphics systems affiliate. It is helping link Calma terminals to its computer library of over 2,000 software applications — enabling Calma users, for example, to convert machine-toolpath designs into actual machine-tool instructions.

Networking — a growing trend

World's largest commercial teleprocessing network, operated by Information Services, is accessed by 5,000 customers. Consisting of four satellite connections and 500,000 miles of circuit interties, it brings local-call access to more than 90% of the telephones in the free world. Network processing power consists of 500 processing and communications computers located in three Supercenters, two in the U.S. and one in the Netherlands.

A new Corporate Data Network Service for GE in-house use is designed to cut communication costs and reduce overlapping systems. With TIPO, the GE telecommunications arm, Information Services has begun a test project to use satellite service to transmit phone calls through part of the GE telephone network.



extend the range of its value-added services. Total investment in the four firms will be \$48 million to \$90 million, depending on whether all maximum earn-outs are achieved.

These companies bring it to a leading position within the software systems and applications fields, Greg Liemandt asserts. These acquisitions are important steps toward the goal of transforming Information Services into a major provider of complete business information solutions.

Importantly, these new companies provide it with a crucial resource — *people*. "In total, we now have more than 5,500 people scattered around the globe, including some of the finest systems designers and software specialists in the industry," he says.

Liemandt makes clear that Information Services encompasses far more than a teleprocessing conduit to raw computer power. "The primary market driver during the next decade will continue to be the shortage of software. With our custom software development capability, coupled with packaged software and consulting expertise, we are well-positioned to expand our role in the computing services market."

The information services industry, he concludes, "is one of GE's most exciting businesses." GE Information Services Company is strong, flexible — "a comer."

Becoming a GE core business someday "is well within the realm of the possible." □

working with financial data to produce summary and detailed tabular reports and graphs on a routine or one-time basis. TABOL's interactive capability allows the operator to "talk" directly to a computer using English-language commands.

Four 1981 acquisitions by GE Information Services of software consulting companies — Lambda Technology, Inc., Banking Systems Inc., Energy Enterprises of Denver, Inc., and Software International Corp. —

Engineered materials — a 'taproot' of GE strategy in the '80s

On the average, every U.S. man, woman and child requires the securing and processing of some 42,000 pounds of raw materials each year.

Today's work in materials research is expected to result in important commercial applications during the 1980s and beyond. General Electric researchers, using "high-tech" equipment capable of probing the innermost structure of matter, are discovering how to juggle the 92 basic elements on the periodic table.

Already, much progress has been made in comprehending the jigsaw puzzle of matter. GE scientists and technicians are on the trail of new plastics and silicones for quality-minded consumers as well as new super-abrasive materials that can improve productivity in the metal-working industry.

With the microelectronics revolution hard upon us, GE is seeking new materials for circuit boards and batteries that will provide computer standby power.

"Our new know-how in materials is leading General Electric to innovative products and into major new businesses," observes Charles R. Carson, Senior VP and Group Executive of Engineered Materials Group. "Today, a scientific breakthrough linked with a commercially feasible process can become a new industry."

Sales of GE engineered materials, about \$2 billion now, are expected to increase substantially by 1985. The materials business anticipates contributing an increasingly greater share of the Company's income.

Technological innovation is a high-stakes game, Carson notes. "It requires long-term investment. Over the past three years, we have invested close to \$100 mil-

lion in materials research, within our Group and at the corporate Research and Development Center. We will invest another \$50 million in the near future."

Engineered Materials now is doubling its manufacturing capacity through expansions — both in the U.S. and abroad. It's building manufacturing facilities — a plastics plant in the Netherlands and a diamond plant in Ireland. A multi-materials facility is planned in the southeastern U.S.

Acquisitions offer another means of growth.

Great Western Silicon of Chandler, Ariz., a supplier of the basic starting materials used to manufacture integrated circuits for the semiconductor industry, was acquired by GE in January.

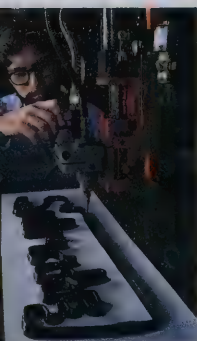
The manufacturing process at Great Western Silicon provides a direct coupling with GE chemistry and chemical engineering expertise employed at the Silicone



Bell-shaped reactors used to produce polycrystalline silicon — the basic building block for manufacturing integrated circuits — attain temperatures of over 1,100 degrees centigrade at Great Western Silicon, a GE affiliate, in Chandler, Ariz. Top left: an ingot of polycrystalline silicon.

Green pellets of Lexan® polycarbonate resin (center left) are finding their way into dozens of applications, including automotive parts. Below left: an auto-engine gasket made of GE silicone is formed by co-op engineering student George Lauder at Automotive Materials Center near Detroit.

Dashboard of the 1981 Mercury Lynx (right) utilizes Lexan resin for lightweight durability. Employees at Automotive Materials Center (l to r): Mohan Asnani, Keith Van Kirk and William Risk. Far right: in quality control lab at Lexan resin plant in Mt. Vernon, Ind., Don Paciorkowski, a GE engineer enrolled in Chemical-Metallurgical Technical Program, checks sample of Bisphenol-A, a chemical used in Lexan resin manufacture.



Products Division, a leading worldwide producer of silane and silicone materials.

Great Western produces polycrystalline silicon which is sold to companies which convert it to a single crystal. Once the crystal ingots are produced, they are further processed into silicon wafers — the specific substrates upon which chips are manufactured.

"The microelectronics industry promises to be an increasingly attractive market for General Electric engineered materials," says Carson. "Our polycrystalline silicon has the electrical properties required for the high-performance characteristics of integrated circuits."

The new auto look in American showrooms today is partly the result of still other GE engineered materials. Carmakers must boost gas mileage ratings to an average of 27.5 mpg by 1985 and are looking to suppliers of materials who can help them design the kinds of quality down-sized cars they need to get there.

Recently, GE expanded its Automotive Materials Center near Detroit to gear up for the present \$1-billion-plus market opportunity. "Through intense applica-

tions development and by working hand-in-hand with the auto companies," reports Carson, "GE plastics, silicones, batteries and circuit-board materials now can be found in well over 100 applications in an automobile. Also helping the auto industry are our high-productivity tungsten carbide and diamond-based metal-cutting systems, which are enjoying widespread use."

It's ironic that GE's success in helping carmakers meet their weight-loss and quality objectives is measured in how many pounds GE can *add* to the new models. For example, many 1981 American cars use more than 15 pounds of GE engineered materials. And there is a similar penetration story with European and Japanese autos as well.

People are the key to new materials processes. To enhance its technological position, the Company is investing — not only in programs, but in technologists as

well. A Chemical-Metallurgical Technical Program currently has nearly 100 participants, and has been expanded internationally.

"In the '80s we foresee the need for many more of *all* types of engineers and scientists," remarks Carson, "because we anticipate a lot of changes in materials and the way we make them."

He concludes: "The engineered materials business is a 'taproot' of GE strategy in the '80s, since so many Company businesses will depend on its innovations in order to grow their own product lines.

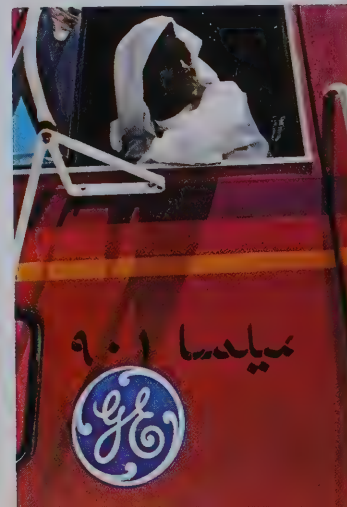
"Our aim is to create new materials businesses and thereby help spawn new businesses elsewhere in GE as well. A few decades ago, almost all of today's engineered materials didn't exist — or were simply ideas in a research lab. Over the next decades, we plan to take present laboratory bench projects and turn these new building blocks into significant contributors." □





المملكة العربية السعودية

At vast Ras Tanura refinery on Arabian Gulf (above), the machinery for processing a portion of Saudi Arabia's "black gold" can be surveyed. Nearby at Dammam (right), service center truck and driver from Middle East Engineering Ltd. of Saudi Arabia (Meelsa) represent GE participation in helping the Kingdom install and maintain its many gas turbines.



Saudi Arabia today: a leap across centuries



Saudi leaders agree that General Electric is 'playing a leading role, helping us in progress, in movement.'

The Kingdom of Saudi Arabia – blessed with wealth befitting an Arabian Nights tale, nurtured by a culture and religion whose roots reach deep into Mideastern history – now stands centerstage in the geopolitics of petroleum. What may be less familiar is how well this ancient land's recent oil wealth is being channeled into improving the lives of the Kingdom's small population – estimates place the number of Saudi Arabian nationals at five to six million.

Saudi Arabia is putting its oil income to work in ways that add to its many superlatives. Already exporting far more crude oil and natural gas liquids than any other nation – and with the largest known oil fields in the world, both onshore and offshore – the Kingdom now boasts the world's largest airport, largest university campus, largest gas turbine site and largest oil export facility. All contain substantial amounts of General Electric equipment.

The Kingdom's annual per capita income exceeds \$22,000, more than double that of the United States and 40 times Saudi Arabia's just a decade ago. Only three nations – the U.S., West Germany and Japan – currently surpass oil-producing Saudi Arabia in export earnings.

So rich in superlatives, Saudi Arabia is likewise a land of paradoxes. For generations, its people have lived the simple, if harsh and nomadic, desert life. Now suddenly, by reason of geography in politically troubled times and through unimaginable wealth that gushes from the earth as "black gold," this land and its traditionally insular people find themselves thrust into a central world role.

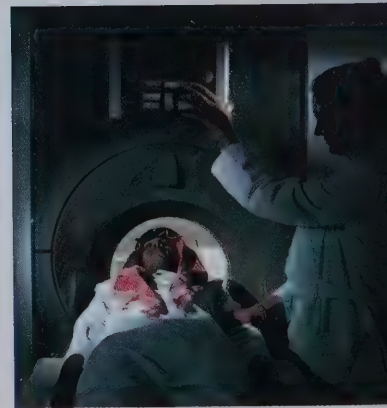
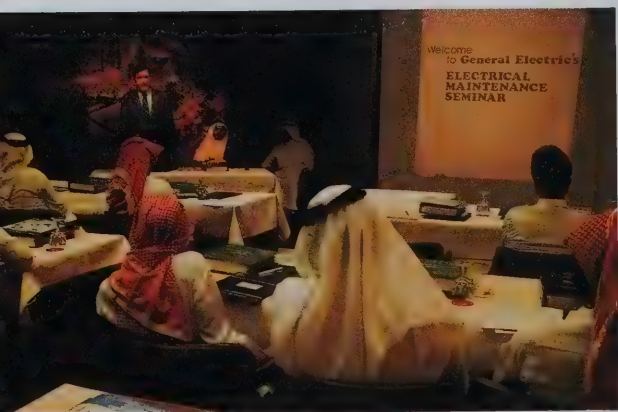
Saudi Arabia's economic ties with the U.S. today are stronger than with any other country. In 1980, some 20% of the products and technologies it bought abroad – nearly \$6 billion worth – originated in the U.S., creating jobs for more than 250,000 Americans. Moreover, the Kingdom has contributed to the world's financial stability, in particular that of the U.S., by maintaining most of its monetary assets, estimated at more than \$100 billion, in dollar investments.

During an Investor interview recently in Riyadh with the Saudi Minister of Commerce, Dr. Solaiman Solaim, the minister spoke of the special bond between his nation and the U.S. With a master's degree from the University of Southern California and a doctorate from Johns Hopkins, Dr. Solaim typifies today's well-traveled and well-informed Saudi leaders. At the meeting in his office, he was wearing the *thobe* and *ghutra*, the traditional white Arab robe and headdress.

"Americans," he observed, "took great risks in the early 1930s by investing in Saudi Arabia. We remain grateful because it was their oil technology that helped us become a prosperous people. Even with world tensions, we stay good friends. We believe in the same principles of free enterprise. We welcome U.S. investment if it contributes to our development. We encourage it with incentives such as tax holidays, interest-free loans and low-cost electricity."

One prominent participant in Saudi development has been General Electric, now in its third decade of activity there. The





Company's involvement began with the sale of gas turbine pump drives to Aramco, the Arabian-American Oil Company.

In the intervening years, business has expanded to such a degree that Saudi Arabia now constitutes one of the largest export markets for GE products and services, observes GE's Paolo Fresco, VP and general manager of Europe, Middle East and Africa Operations. "The pace and scope of the Kingdom's infrastructure development is unprecedented, and the Saudi Arabian government has demonstrated its ability to manage these projects with exceptional skill."

Helping with the work, some 35 GE businesses today are involved in the Kingdom in activities ranging from gas turbines to information services, mobile radios to medical systems, air conditioners to aerospace equipment.

So vast is today's effort to build the infrastructure and industrialize the Kingdom, and so swiftly is it being accomplished, that businessmen, technicians and laborers travel there from around the globe. In Riyadh, for example, so many nationalities have come together to construct so much — office buildings, apartment complexes, power plants, streets, schools, a new airport — that a "United Nations" of industry seems to be erecting, all at once, a new city in the midst of the old.

To a visitor, it's as if the past had leapfrogged the present to carry Saudi Arabia into the future.

In such a quantum jump, apparent anomalies abound:

► Although the literacy rate is still a scant 15% of the population — there wasn't a single university and just three small high schools as recently as 25 years ago — Saudi Arabia today can boast more Ph.D.s at the Cabinet level of government than are at that level in the U.S.

► The slender minarets of mosques rise from a forest of television antennas in the cities, and *bedouin* camels pause to nibble grass alongside pipelines whose flow of oil is monitored by computer and microwave.

Today's Saudi Arabia, a study in contrasts, is entwining family ties and religious beliefs with the technological world of the 20th century in a truly *Arabian* manner. Other countries may face similar challenges, but nowhere do they seem so dramatic as in Saudi Arabia, birthplace and spiritual home of Islam and its 800 million followers.

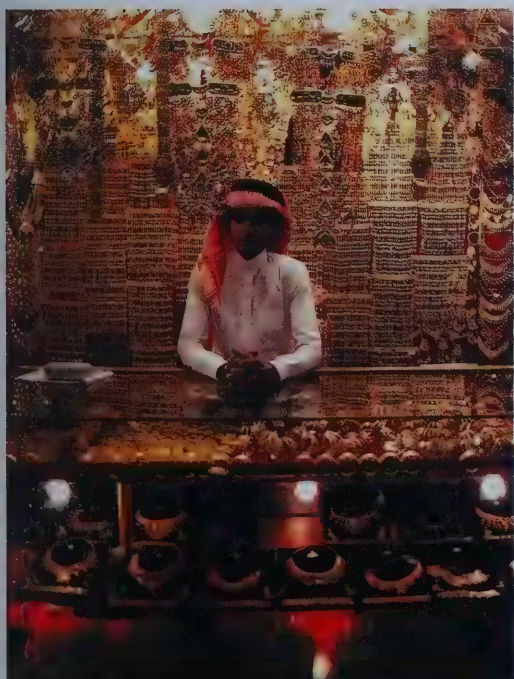
It is the strength of this religion, in fact, that is likely to do much to hold the Kingdom stable through the Mideast's turbulent times. To Muslims — and all Saudis are Muslims — Islam is more than a religion; it's a total way of life. Saudis believe their faith is strong enough to guide them as they carefully accept and absorb the best that the West has to offer — technology, for instance — while rejecting corrosive elements of the secular modern world.

The Saudi ambassador to the U.S., H. E. Faisal Alhegelan, recently spoke with the *Investor* in Washington, D.C., about his nation's ability to keep its balance during its "transitional" period:

"Arabian society has a deep feeling of structure. We have a solid base of religion and culture. When we adopt modern technology, we put it in the proper perspective. We use others' services and technologies — not their cultures — to move ahead. Of course, there will be some change, but

Sunrise breaks over Riyadh 7 (top left) near capital city. This huge new power plant includes 16 GE gas turbines generating 50 mw each. Far left: because Saudi Arabia puts highest priority on developing skilled manpower from its small population, GE sponsors programs such as week-long electrical maintenance seminars in Riyadh.

Above: even as it builds its future, the Kingdom reveres tradition, depicted by gold stall in Riyadh's old market district. In Riyadh, GE is helping develop better communications through sale of its silicone products for new TV tower (middle left), and is improving health care with computed tomography units at King Faisal Hospital.



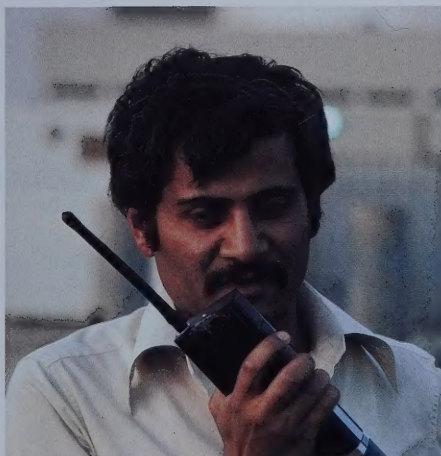
it will not affect our beliefs and values.

"What technology can offer us is very important," he continued. "General Electric is one of the companies playing a leading role. It's changing the face of everyone's life. Your services are helping us in progress, in movement."

Long a partner in Saudi Arabian *progress* and *movement*, GE installed its first gas turbine there in the mid-1950s and has since seen GE-designed gas turbine installations multiply to 118 gas turbines spread across the Kingdom, far more than any other company can claim. The Company's gas turbines generate nearly 40% of the country's electricity.

One mammoth installation, Riyadh 7, the largest concentration of gas turbines anywhere, comprises 16 MS7001 units totaling 800 megawatts and represents sales of \$220 million. Also, four MS7001 gas turbines help generate electricity for the holy city of Mecca, birthplace of The Prophet Mohammed and destina-





In a land that is 70% desert, GE gas turbines such as the one in Meelsa service center (left) generate much of the Kingdom's electricity, including power for Lucalox® streetlighting in Al-Khobar (top).

Center above: a principal GE Saudi partner is Shaikh Ali Tamimi, pictured with Aramco Chairman John J. Kelberer at the Dhahran well – still in operation – where oil was first discovered in 1938. Below: mobile radios from GE and its European affiliate Storno find wide usage in Saudi oilfields.

tion of up to two million Muslim pilgrims yearly.

These generating plants, along with the current construction activity in Saudi Arabia, are part of three consecutive five-year plans designed to blueprint the Kingdom's entry into the modern era.

Expenditures of the Third Development Plan, 1980-85, may exceed \$300 billion. While the first two plans focused on infrastructural development, the third plan centers on boosting skilled indigenous manpower. It also seeks to lessen the Kingdom's dependence on crude oil exports through development of "downstream" industries such as petrochemicals.

Commenting on his country's achievements thus far, Dr. Fouad al Farsy, Deputy Minister of Industry, said in an interview in Riyadh: "Our last ten years here have been remarkable. Wealth is filtering down; everyone is enjoying the benefits. There is no taxation. We provide housing programs, social help, free health care, free education – we'll open 500 schools this year. Our people today have a much higher standard of living."

Dr. al Farsy, seated in his office with three telephones and a computer terminal within reach, educated at Duke University, spoke of the need for his country to industrialize. "There is no conflict," he stressed, "between Islam and industrialization. We need to develop more industry."

"Our industrialization follows the philosophy of free enterprise – investment is entirely open to the private sector," he said. "Our main concern is to make sure our business joint ventures are with established companies. We don't want Johnny-come-latelys."

Aware that its future rests on a slowly but steadily disappearing store of oil, Saudi Arabia has opted to build industrial facilities that will expand and diversify the Kingdom's economy.

Two showcases for this ambitious program, and examples of monumental civil engineering projects, are the new industrial cities of Jubail and Yanbu. Jubail: a \$50 billion complex on the Arabian Gulf. And 750 miles to the west on the Red Sea, its \$30 billion twin, Yanbu. Huge new pipelines for crude oil and natural gas link the two.

Jubail and Yanbu will house such oil-related "downstream" industries as petrochemical and fertilizer plants, liquefied natural gas facilities, refineries, steel mills and light manufacturing. Gas-collection systems will recover valuable gases that currently are being flared off and lost when oil is pumped from the ground.

As it has in much of Saudi Arabia's development, General Electric is participating in the work at Jubail and Yanbu and in gas recovery – most prominently with construction contracts and a variety of electrical products.

GE – as required of all offshore companies operating in the Kingdom – works with Saudi business partners. Its first partnerships were with the Shaker and Tamimi families:

Shaker. Shaikh Ibrahim Shaker fought alongside King Abdul Aziz to found the Kingdom a half-century ago. In the '50s, before electric utilities were established, Shaikh Shaker became the country's first appliance distributor, selling GE refrigerators and washing machines to people who had their own power generators. His son Ghassan now oversees sales of GE appliances as well as power generation equipment to selected customers.

Tamimi. Shaikh Ali Tamimi, one of the Kingdom's leading businessmen, is GE's associate in the sale of power systems equipment in the eastern province. He also is a partner in Meelsa, the GE apparatus service center at Dammam. Along with Shaikh Ghassan Shaker and GE's Italian affiliate Sadelmi, Shaikh Tamimi participates in S.S.T. (Sadelmi-Shaker-Tamimi) which builds power stations, power delivery systems and industrial facilities.

GE has since expanded its business relationships in the Kingdom. No other company probably can claim as many associations – representative and distributor agreements with 14 different business families, some of the most venerable and successful names in the Kingdom.

For example, GE is a partner with Shaikh Abdalgafar Jamjoom in Jedac, a joint-venture company which manufactures electrical switchboards and panelboards. Another joint-venture company is Samge (Saudi American General Electric), in which Saudi interest is shared among five local partners, including Shaikh Salim bin Laden who has been associated with GE in developing the market for a number of high-technology components.

Jeddah International

Airport, a \$6 billion facility covering 40 square miles, represents the most spectacular project that S.S.T. has been involved in to date. This complex dwarfs any other world airport. Through use of its computer timesharing services obtained via satellite, the GE Information Services center in Riyadh also has been involved, helping procure construction materials.

Centerpiece of the airport is the striking *hajj* terminal, built for use by pilgrims on their way to Mecca. S.S.T. installed the terminal's electrical distribution equipment as well as the cable network and chilled water system throughout the airport complex. Total GE involvement: \$150 million.

S.S.T. also is helping build a mammoth new airport at Riyadh which, when completed, will cover more than twice the area of the Jeddah complex. And the company is a major participant in building the world's largest college campus – the new Riyadh University.

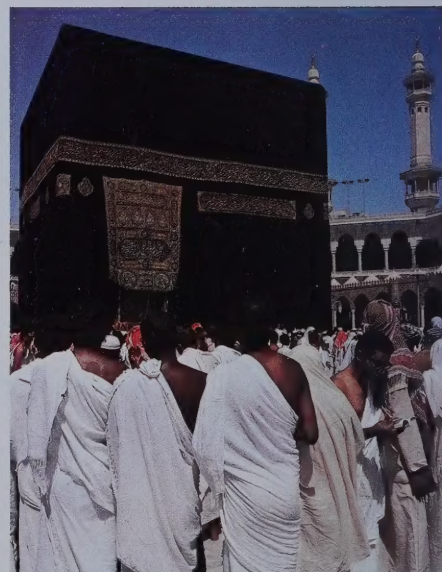
From all the foregoing discussion, it is obvious that Saudi Arabia is moving – *fast*. It is a leader of the Arab world. Its glorious heritage reveals much affinity for scientific pursuit. The Arabic concepts of zero and negative numbers evolved into algebra, an Arabic mathematics. The windmill was pioneered by Arabs, as were the waterwheel and various instruments of astronomy and navigation.

But much modern technology passed Saudi Arabia by, and now, with help from such sources as General Electric, the Kingdom is making up for lost time.

In Washington, D.C., Ambassador Alhegelan concluded his talk with the *Investor* in this way:

"What we've done recently, since 1975 really, has taken many countries 300 years – the U.S., 150 years. We've moved ahead 14 centuries to put ourselves in the 20th century. It has not been easy.

"The new generation wants even more progress," he summed up. "In some countries, young people seemingly have no belief in their society; there's no general direction in their social or political thinking. In Saudi Arabia, our people have an energy, an eagerness for learning and progress. The future is very bright." □



Every Muslim hopes to visit Mecca's Grand Mosque (above) at least once. Pilgrimages are being facilitated by enormous hajj terminal at Jeddah's new airport (top right).

Now in U.S., two Saudi students (near right) from the University of Petroleum and Minerals are earning college credits in a 28-week residency at GE facilities under a Company-sponsored co-op education program. Middle right: Salem Hashash supervises appliance activities for Shaikh Ghassan Shaker, a prominent Saudi partner. The latter's office building, topped by a lighted GE nameplate in Arabic, overlooks downtown Jeddah.



INVESTOR

GENERAL ELECTRIC

Volume 12 Number 3 Fall 1981

The *Investor* is published by the General Electric Company to inform share owners and investors about the Company. Others may receive the *Investor* on request.

Editor: Linn A. Weiss

Associate Editors: Devere E. Logan; Edna Vercini

Editorial Board: Leonard Vickers, Vice President-Corporate Marketing Programs and Communications; Frederick N. Robinson, Manager, Corporate Editorial Programs; John L. Ingersoll, Manager, Corporate Investor Communications

Art Direction: Jack Hough Associates, Inc.

Photographers: Steve Dunwell, Gary Gladstone, Phillip Harrington, Tom Hollyman, Ted Horowitz, Tony Kelly, Wayne Lennebacker, Jack Markx, Randy McKay, William Strode, Tom Tracy, Frank White

Note: **GENERAL ELECTRIC** and GE are registered trademarks of General Electric Company. ® and ® indicate registered and unregistered trade and service marks of General Electric Company. © 1981 General Electric Company, Fairfield, Connecticut 06431

'In progress' look at GE innovation



One of U.S. industry's most modern electronics and computer science laboratories is now under construction in Schenectady, N.Y., as part of a \$58 million expansion program at the General Electric corporate Research and Development Center. The program will increase the Center's floor space by nearly 50%.

The R&D Center has the key task of long-range research for highly diversified GE businesses – including development of very-large-scale-integration (VLSI) process and circuit technology to be used at GE microelectronics facilities in California, New York and North Carolina.

Upon completion of the Center's new structure by the end of 1982, the electronics and computer-science labs will be housed in roughly half the expansion area. This will free up space elsewhere at the Center for other R&D activities – in chemicals, energy and materials.

Meanwhile, another major building effort is taking place in Charlottesville, Va. (lower left), where the Company's Industrial Electronics Group is tripling the present square footage of its local facilities, including construction of a new Industrial Electronics Applications Lab to help develop industrial automation products.

To be completed by mid-1982, this \$31 million expansion program will spearhead GE plans for the "factory of the future."

